
E-mc

Release 0.9.1

An Pham

May 19, 2024

CONTENTS

1	Features	1
2	Document	3
3	Image	39
4	Cloud	45
5	Database	95
6	Task	117
7	Build Options	121
8	Modules	129
9	References	185
10	Versions	187
11	squared-functions	189
12	NodeJS 14 LTS	191
13	License	193
	Index	195

FEATURES

1.1 Protocols

- HTTP/2
- FTP/SFTP/BitTorrent/Metalink¹ (using [aria2](#))
- Unix domain socket²

1.2 Encoding

- Gzip
- Deflate
- Brotli (*br*)
- Zstandard (*zstd*)³

¹ `apt/brew install aria2`

² { `socketPath`: “/tmp/static0.sock”, `uri`: “file:///path/filename” }

³ `npm i zstd-codec`

2.1 Interface

```
interface AssetCommand {
    selector: string;

    saveAs?: string; // js | css | image
    exportAs?: string; // js | css
    saveTo?: string; // image | video | audio (transforms are given auto-generated_
    ↪filename)
    pathname?: string; // alias for "saveTo"
    filename?: string; // pathname + filename = "saveAs"

    process?: string[]; // html | js | css
    commands?: string[]; // image
    tasks?: string[];
    cloudStorage?: CloudService[];

    inline?: boolean; // js | css | image (base64) | font (base64)
    blob?: boolean; // format: base64
    preserve?: boolean; // html | css | append/js (cross-origin) | append/css (cross-
    ↪origin)
    extract?: boolean; // css (@import)
    module?: boolean; // js (esm) | css
    dynamic?: boolean; // image (srcset) | element (non-void)
    static?: boolean; // Removes URL search params
    remove?: boolean; // Removes element from HTML page
    ignore?: boolean;
    exclude?: boolean; // js | css (ignore + remove)

    attributes?: Record<string, string | null | undefined>;
    rewrite?: false; // Overrides preserveCrossOrigin
    rewrite?: URLData; // Replace certain URL components (e.g. hostname)
    download?: boolean; // Forces processing for unknown types (default is "true" for_
    ↪known types)

    hash?: "md5" | "sha1" | "sha224" | "sha256" | "sha384" | "sha512";
    hash?: "md5[8]" // Will shorten hash to the first 8 characters

    checksum?: string | { algorithm: string; value: string; digest?: string }; //
```

(continues on next page)

(continued from previous page)

```

↳Download URI (default is "sha256")
  checksumOutput?: string | { /* Same */ }; // Expected locally transformed result

  incremental?: false | "none" | "staging" | "etag" | "exists"; // Will override_
↳parent.incremental
  incremental?: true; // Will override parent.incremental = false

  metadata?: PlainObject; // Custom values passed to transformers
  metadata?: { "__sourcemap__": "inline" }; // System post processing command

  mergeType?: "none" | "over" | "under"; // Used when different selectors target same_
↳element

  watch?: boolean | { interval?: number; expires?: string }; // js | css | image

  document?: string | string[]; // Usually "chrome" by framework (override)

  type: "html" | "js" | "css" | "data"; // Script templates
  template: {
    module?: string;
    identifier?: string;
    value?: string;
  };

  type: "text" | "attribute" | "display"; // dynamic is valid only with "text"
  dataSource: {
    source: "uri" | "local" | "export" | "json";
    source: "cloud";
    source: "mariadb" | "mongodb" | "mssql" | "mysql" | "oracle" | "postgres" |
↳"redis";
    postQuery?: string;
    preRender?: string;
    whenEmpty?: string;
  };

  type: "append/js" | "append/css" | "append/<tagName>"; // Includes "prepend"

  type: "replace";
  textContent: string; // Replace element.innerHTML
}

```

2.2 Inline commands

Bundles can be created with these HTML tag names.

- **saveAs**: html + script + link + raw assets
- **exportAs**: script + style
- **exclude**: script + link + style

JS and CSS files with the same path and filename will automatically create a bundle when there are no conflicts in call

ordering.¹

2.2.1 data-chrome-file

1. **path/filename**
 - a. saveAs²
 - b. exportAs
2. ::
3. format...³

Listing 1: JSON⁴

```
<style data-chrome-file='{ "exportAs": "css/prod.css", "process": ["lint", "beautify"] }
↪ '>
  body {
    font: 1em/1.4 Helvetica, Arial, sans-serif;
    background-color: #fafafa;
  }
</style>
```

Listing 2: Inline

```
<link rel="stylesheet" href="css/dev.css" data-chrome-file="saveAs:css/prod.
↪css::lint+beautify" />
```

Listing 3: Output

```
<link rel="stylesheet" href="css/prod.css" />
```

2.2.2 data-chrome-options

- **preserve**⁵
 - html
 - css
- **inline**
 - js: Rendered inline with **<script>**
 - css: Rendered inline with **<style>**
 - image: Rendered as base64 from file
- **module**⁶
 - js: ESM

¹ MIME (mimeType) is required when bundling torrents.

² Use “~” for current path and filename.

³ Multiple transformations per bundle can be chained using the “+” symbol.

⁴ data-chrome-file=’ “exportAs”: “css/prod.css”, “process”: [“lint”, “beautify”]’

⁵ Do not use the built-in transformers per document.

⁶ “true” | “false” - config | “no-module” - inline

- css: SASS
- **extract**
 - css: @import rules are inlined into parent file (*same origin*)
- **blob**
 - image: HTML and CSS from **base64**
 - font: CSS from **base64**
- **dynamic**
 - image: “srcset” uses query parameters with an image resizer
 - element (*non-void*): mixed content which uses a view engine template (e.g. *ejs*)
- **compress (array)**
 - image: imagemin⁷
 - font: woff + woff2
 - png: TinyPNG service⁸
 - gz: Gzip + Zopfli⁹
 - br: Brotli
- **static**
 - all: Remove query string from URL
- **crossorigin**
 - all: Same as preserveCrossOrigin [*download: false*]
- **download**^{Page 6, 10}
 - all: Source files that are not usually downloaded (e.g. *link[rel=alternate]*)
- **hash**^{11 12}
 - js
 - css
 - map
 - img
 - font
 - audio
 - video
- **remove**
 - all: Remove element during finalization
- **charset (string)**

⁷ Optionally installed NPM plugins are required. (e.g. imagemin-pngquant)

⁸ png | jpeg | webp

⁹ npm i node-zopfli

¹⁰ “true” - explicit | “false”

¹¹ filename + content hash (productionRelease=true)

¹² Value can be limited to the starting prefix. (e.g. md5[8] - Minimum is 4)

- utf-8 (*default*)
- utf-16
- utf-16le
- latin1
- utf-16be (*unsupported*)

Listing 4: JSON^{Page 7, 13}

```
<style data-chrome-options='{ "preserve": true, "hash": "md5", "compress": [{ "format":
↪ "gz" }], "encoding": "utf-16" }'>
  body {
    font: 1em/1.4 Helvetica, Arial, sans-serif;
    background-color: #fafafa;
  }
</style>
```

Listing 5: Inline

```
<link rel="stylesheet" href="css/dev.css" data-chrome-options=
↪ "preserve|md5|compress[gz]|utf-16">
```

Tip: Whitespace can be used between anything for readability.

2.2.3 data-chrome-metadata

Listing 6: Any plain object¹⁴

```
<script
  src="/common/util.js"
  data-chrome-metadata='{ "rollup-custom": { "import-maps": {} }, "terser-custom": {
↪ "config": {} } }'>
</script>
```

Inline commands are usually sufficient for simple web pages. More advanced configurations are possible using a JSON (*yaml*) external configuration file.

```
{
  "selector": "head > script:nth-of-type(2), head > script:nth-of-type(3)",
  "type": "js",
  "saveAs": "js/modules2.js",
  "process": ["minify"],
  "metadata": { "custom-prop": true }
}
```

¹³ data-chrome-options='preserve': true, "hash": "md5", "compress": [{ "format": "gz" }], "encoding": "utf-16"

¹⁴ data-chrome-metadata='rollup-custom': { "import-maps": {} }, "terser-custom": { "config": {} }

2.3 Attributes

There are possible scenarios when a transformation into another format will require new attribute values.¹

```
<link rel="alternate" type="text/plain" href="css/dev.sass" />
```

Listing 7: JSON

```
{
  "selector": "link[rel=alternate]",
  "type": "css",
  "filename": "prod.css",
  "download": true, // Required when rel="alternate"
  "hash": "md5", // prod-8ba5cde2c04d6628dd6b0d62b0a3cac9.css
  "attributes": {
    "rel": "stylesheet",
    "type": "text/css",
    "title": "",
    "disabled": null,
    /* SRI */
    "integrity": "sha512", // CORS required (sha256 | sha384 | sha512)
    "crossorigin": "anonymous"
  },
  "process": ["compile"]
}
```

Listing 8: Inline

```
<link rel="alternate" type="text/plain" href="css/dev.sass" data-chrome-file='{ "saveAs
→": "css/prod.css", "process": ["compile"] }' data-chrome-attributes='{ "rel":
→"stylesheet", "type": "text/css", "title": "", "disabled": null, "integrity": "sha512",
→ "crossorigin": "anonymous" }' data-chrome-options="download" />
```

¹ Setting an attribute to “undefined” will remove it from the HTML output.

Listing 9: Output

```
<link rel="stylesheet" type="text/css" title="" disabled href="css/prod.css" integrity=
↪ "sha512-365M9279XHmH5iUcnWAVLXbLCqmntex51g5yp+jrzci79PhU0ZyK/ebMIzoR46y7okDgZYZhTImDt7/
↪ 06IhxQw==" crossorigin="anonymous" />
```

You can also use the workspace feature in [squared-express](#) to precompile any text format and stream the transformed output directly into the source.

2.4 Data Sources

Using the same concept as a database you can read from these files:

- **JSON**
- **YAML**
- **JSON5**¹
- **XML**²
- **TOML**³

Then optionally select nested objects with these *query* expressions:

- **JSONPath**⁴
- **JMESPath**⁵

Tip: These examples can also be used with *Cloud* and *DB* data sources except every provider has a different way to *query* their data.

2.4.1 Interface

```
import type { DataSource as IDataSource } from "../db/interface";

interface DataSource extends IDataSource {
  source: "uri" | "local" | "export" | "json";
  type: "text" | "attribute" | "display"; // Element action

  viewEngine?: {
    name: string; // NPM package name
    singleRow?: boolean;
  };
  viewEngine?: string; // settings.view_engine[name]? + settings.users[username].view_
↪ engine[name]? (overlay)
```

(continues on next page)

¹ npm i json5

² npm i fast-xml-parser

³ npm i toml

⁴ npm i jsonpath

⁵ npm i jmespath

(continued from previous page)

```

    /* OR */
    value?: string | string[] | Record<string, unknown>; // Replace placeholders per row
↳ of results
    /* OR */
    template?: string; // Will replace "value" from local file
    /* OR */
    dynamic?: boolean; // Uses element.innerHTML rather than element.textContent

    query?: string; // startsWith("$") JSONPath otherwise JMESPath

    ignoreCache?: boolean; // Bypass cache without saving
    ignoreCache?: 1; // purge cache with saving
    ignoreEmpty?: boolean; // Will not modify anything when there are no results
    ignoreCoerce?: boolean; // Will not convert inline constructors to native objects
}

interface TextDataSource extends DataSource {
    type: "text";
    leadingText?: string;
    trailingText?: string;
}

interface DataObject {
    format: "json" | "yaml" | "json5" | "xml" | "toml";
    options?: PlainObject; // Parser options (yaml + xml)
}

interface CascadeAction {
    /*
        When array [{ a: 1 }, { b: 2 }] then "0.a == 1" OR "1.b == 2" (leading only)
        When multi-dimensional array { a: [[1], [2,3]] } then "a[0].0 == 1" OR "a.1.1 == 3
↳ " (brackets are optional)
        When key has spaces { " a ": { "b ": { c: 1 } } } then " a "["b ".c OR " a "."b
↳ "[c] == 1 (quotes are optional)
        When key has dot operator { a: { "b.c": 1 } } then a[b\\.c] == 1
        Invalid usage a[0][1][2] instead use a.0.1.0 or a[0].1[2] (max is 1 consecutive
↳ bracket)
    */
    cascade?: string; // Called before "query"
    fallback?: object; // Used when there are missing fields
}

```

2.4.2 Inline “json”

```
interface JSONDataSource extends DataSource, CascadeAction {
    source: "json";
    items?: unknown;
}
```

Example usage

```
{
  "selector": "main",
  "type": "text",
  "dataSource": {
    "source": "json",

    "items": [
      { "title": "1", "description": "first item" },
      { "title": "2", "description": "second item" }
    ],
    "leadingText": "<ul>",
    "value": "<li><b>${title}</b>: ${description}</li>", // <ul><li><b>1</b>: first item
    ↪</li><li><b>2</b>: second item</li></ul>
    "trailingText": "</ul>",

    "items": { "title": "1", "description": "first item" },
    "value": "<b>${title}</b>: ${description}", // <b>1</b>: first item
    /* OR */
    "items": {},
    "value": "<b>1</b>: first item"
  }
}
```

2.4.3 Remote file “uri”

```
interface UriDataSource extends DataSource, DataObject, CascadeAction {
    source: "uri";
    uri: string; // Will perform a fetch request
    /* Method "POST" */
    body?: unknown; // Required
    contentType?: string;
}
```

Example usage

Reusing configuration templates is possible with URL search parameters. All parameters (*excluding* “value”) from any source can be replaced using the `{{param}}` syntax.

Listing 10: `http://localhost:3000/project/index.html?file=demo&format=json`

```
{
  "selector": "main img",
  "type": "attribute",
  "dataSource": {
    "source": "uri",
    "format": "{{format}}", // json
    "uri": "http://hostname/project/{{file}}.{{format}}", // http://hostname/project/
    ↪demo.json

    "query": "$[1]", // Row #2 in result array (JSONPath)

    /* Result: { "src": "image.png", "other": { "alt": "description" } } */
    "value": {
      "src": "src",
      "alt": "other.alt"
    }
  }
}
```

Caution: Query parameters will also replace values inside the **attributes** property.

Listing 11: POST

```
{
  "selector": "h1",
  "type": "text",
  "dataSource": {
    "source": "uri",
    "uri": "https://hostname/api/v1/items", // Perform secure API request
    "body": {
      "id": "1"
    },
    "format": "json", // Response headers["Accept"] (generated)
    "contentType": "application/json", // Request headers["Content-Type"] (optional)

    "value": "<b>{{title}}</b>: {{description}}"
  }
}
```

Note: JSON will be sent by default for *POST* when both **format** and **contentType** are empty.

2.4.4 Local file “local”

```
interface LocalDataSource extends DataSource, DataObject, CascadeAction {
    source: "local";
    pathname: string;
}
```

Example usage

```
{
  "selector": "main img",
  "type": "attribute",
  "dataSource": {
    "source": "local",
    "format": "xml",

    "pathname": "./path/data.xml", // yaml + json5 + toml + xml + cjs (settings.
    ↪directory.data + users/username/?)
    /* OR */
    "pathname": "/path/to/data.xml", // Local files require read permissions

    "query": "$.root.row[1]", // Second item in "row" array (JSONPath)

    /* Result: { "title": "Tokyo", "description": "Japan" } */
    "value": "<b>${__index__}. ${title}</b>: ${description}" // "__index__": Row index,
    ↪value
  }
}
```

Listing 12: Conditional statement

```
{
  "selector": "main div",
  "type": "display",
  "dataSource": {
    "source": "mongodb",
    "uri": "mongodb://localhost:27017",
    "removeEmpty": true, // Includes invalid conditions

    "value": "attr1", // Remove when: null or undefined
    "value": "-attr2", // Remove when: attr2=falsey
    "value": "+attr3", // Remove when: attr3=truthy
    /* OR */
    "value": [
      "attr1", // AND
      ":is(OR)",
      "-attr2", "-attr3", // OR
      ":is(AND)",
      "+attr4" // Remove when: attr1=null + attr2|attr3=falsey + attr4=truthy
    ]
  }
}
```

To completely remove an element all *AND* conditions have to be *true* and one *OR* per group is *true*. Using a view engine is recommended if you require a more advanced statement.

Returning an empty result or a blank string (*view engine*) is *false*.

2.4.5 External source “export”

Custom functions or packages can be used to return any kind of dataset from any source providing a temporary solution during development.

```
interface ExportDataSource {
  source: "export";
  params: unknown; // Passed into custom function (required)

  pathname?: string; // Module file (.cjs) | Local file (.js) | inline function | NPM
  ↪package
  /* OR */
  settings?: string;
  /* OR */
  execute?: (...args: unknown[]) => unknown;

  persist?: boolean; // Default is "true"
}
```

Example settings

Listing 13: squared.json

```
{
  "document": {
    "chrome": {
      "handler": "@pi-r/chrome",
      "eval": {
        "function": true // Enable inline functions
      },
      "settings": {
        "export": {
          "data-example": "(params, resolve, require) => { const fs = require('fs');
          ↪resolve(JSON.parse(fs.readFileSync(params.uri))); }",
          "async-example": "async (params, require) => { const fs = require('fs'); const
          ↪result = await fs.promises.readFile(params.uri); return JSON.parse(result); }"
        }
      }
    }
  }
}
```

Example file “.cjs”

Listing 14: /path/to/postgres.cjs

```
const pg = require("pg");

const config = {
  host: "localhost",
  user: "*****",
  password: "*****",
  database: "squared",
  port: 5432,
  ssl: true
};

module.exports = async function (params) {
  const client = new pg.Client();
  await client.connect();
  const { rows } = await client.query("SELECT * FROM demo WHERE id = $1", [params.id]);
  await client.end();
  return rows;
};
```

Example file “.js”

Listing 15: /path/to/mysql.js

```
function (params, resolve, require) { // async function (params, require)
  const mysql = require("mysql");
  const conn = new mysql.createConnection({
    host: "localhost",
    user: "*****",
    password: "*****",
    database: "squared",
    port: 3306,
    ssl: true
  });
  conn.connect();
  conn.query("SELECT * FROM demo WHERE id = ?", [params.id], (err, result) => {
    if (!err) {
      resolve(result);
    }
    else {
      console.log(err);
      resolve(null);
    }
  });
  conn.end();
}
```

Note: Using this approach with databases is not recommended.

Example usage

```
{
  "selector": "main p",
  "type": "text",
  "dataSource": {
    "source": "export",

    "pathname": "npm:postgres-custom", // npm i postgres-custom
    /* OR */
    "pathname": "./path/to/postgres.cjs", // settings.directory.export + users/username/?
    /* OR */
    "settings": "data-example", // settings.export

    "value": "`<b>${this.title}</b>: ${this.description} (${this.total * 2})`", //␣
    ↪Function template literal (settings.eval.function)

    /* go lang template syntax - partial support */
    "value": "{{if !expired}}<b>${title}</b>: ${description}{{else}}Expired{{end}}", //␣
    ↪Non-nested single conditional truthy property checks
    "value": "{{if not expired}}<b>${title}</b>: ${description}{{else}}Expired{{end}}", /
    ↪/ Case sensitive
    "value": "{{if and (user.total) (ge user.total postMin) (lt user.total postMax)}}<b>${
    ↪title}</b>: ${description}{{else if (eq user.total 0)}}Expired{{end}}}"
  }
}
```

Important: Parenthesis where noted in value are required.

2.4.6 View Engine

```
interface ViewEngine {
  name: string; // NPM package name
  singleRow?: boolean; // Template data is sent in one pass using an Array[]
  outputEmpty?: boolean; // Pass empty results to template engine
  options?: {
    compile?: PlainObject; // template = engine.compile(value, options)
    output?: PlainObject; // template({ ...options, ...result[index] })
  };
}
```

Note: Template engines with a `compile(string[, options]): (data?: Record<string, any>) => string` method are compatible.

Example usage

Using `template` (*external*) is the same as `value` (*inline*) except the reusable content is stored inside a cacheable template server directory.

```
{
  "selector": "main",
  "type": "text",
  "dataSource": {
    "source": "local",
    "format": "json",
    "pathname": "./path/to/data.json",

    "viewEngine": "main-ejs", // settings.view_engine[viewEngine]
    /* OR */
    "viewEngine": {
      "name": "ejs", // NPM package name
      "singleRow": true
    },

    "value": "<b><%= title %></b>: <%= description %>",
    /* OR */
    "template": "./path/to/content.ejs", // settings.directory.template + users/username/
    ↪?
    /* OR */
    "dynamic": true, // element.innerXml? (with tags)
    "dynamic": false, // element.textContent? (plain text) || outerXml (parsed from ↪
    ↪source)

    "encoding": "utf-8"
  }
}
```

Hint: `EJS`⁶ is used as the reference templating engine.

2.4.7 Event callbacks

You can create named callbacks for **postQuery** and **preRender** anywhere inside the HTML. It is more readable than inside a configuration file and can be reused for similar queries.

```
interface DataSource {
  postQuery?: string | ((result: unknown[], item: DataSource) => unknown[] | void);
  preRender?: string | ((output: string, item: DataSource) => string | void);
  whenEmpty?: string | ((result: unknown[], item: DataSource) => unknown[] | void);
}
```

⁶ npm i ejs

Example usage

Only one function can be defined per `<script type="text/template">` element.

```
<script type="text/template" data-chrome-template="data::postQuery-example">
  async function (result /* PlainObject[] */, dataSource) {
    if (result.length) {
      return await fetch("/db/url", { method: "POST", body: JSON.stringify(result) }).
    ↪ then(data => data.map(item => ({ name: item.key, value: item.value })));
    }
    return null; // "result" will display unmodified when not an array
  }
</script>

<script type="text/template" data-chrome-template="data::preRender-example">
  function (value /* string */, dataSource) {
    return value.replaceAll("<", "&lt;");
  }
</script>

<script type="text/template" data-chrome-template="data::whenEmpty-example">
  function (result /* PlainObject[] */, dataSource) {
    result[0] = { value: "Empty" }; // result.length is 0
  }
</script>
```

Listing 16: Alternate

```
{
  "selector": "",
  "type": "data",
  "template": {
    "identifier": "postQuery-example",
    "value": "async function (result, dataSource) { /* Same */ }" // Arrow functions not
    ↪ supported
  }
}
```

Warning: Using `<script>` templates requires the setting `eval.template = true`.

2.4.8 @pi-r/chrome

Added in version 0.7.0:

- `DataSource` property **ignoreCoerce** was created.

Added in version 0.6.4:

- `UriDataSource` property **contentType** | **body** for HTTP method `POST` was implemented.
- `DataSource` property **source** option “**json**” as `JSONDataSource` was implemented.
- `TextDataSource` property **leadingText** | **trailingText** were created.

2.5 Plugins

2.5.1 Interface

```
interface TransformOutput {
  pathname?: string;
  filename?: string;
  mimeType?: string;
  sourceFile?: string;
  sourcesRelativeTo?: string;
  metadata?: unknown;
  external?: PlainObject;
}
```

```
interface ITransformSeries extends IModule, TransformOutput {
  type: "html" | "css" | "js";
  baseConfig: PlainObject;
  outputConfig: PlainObject; // Same as baseConfig when using an inline transformer
  sourceMap: SourceMap; // Primary sourceMap
  code: string;
  metadata: PlainObject; // Custom request values and modifiable per transformer
  productionRelease: boolean;
  supplementChunks: ChunkData[];
  imported: boolean; // ESM detected
  createSourceMap(code: string): SourceMap; // Use "nextMap" method for sourceMap
  ↪(additional sourceMaps)

  /* ESM */
  getMainFile?(code?: string, imports?: StringMap): SourceInput<string> | undefined;
  getSourceFiles?(imports?: StringMap): SourceInput<[string, string?, string?][]> |
  ↪undefined;

  /* Return values */
  out: {
    sourceFiles?: string[]; // ESM (e.g. files to watch)
    ignoreCache?: boolean;
    messageAppend?: string;
    logAppend?: LogStatus[];
    logQueued?: LogStatus[];
  };

  version: string; // Requested version

  packageName: string;
  packageVersion: string; // Context version

  /* Module */
  host: IFileManager;
  username: string;
}
```

2.5.2 Built-In

JS and CSS files can be optimized further using these settings:

1. compile
2. bundle[-es6]
3. lint
4. es5
5. transform
6. beautify
7. minify
8. es5-minify
9. minify-svg
10. custom name

You can define or undefine your own optimizations in `squared.json`:

HTML

posthtml	@pi-r/posthtml	5
prettier	@pi-r/prettier	6
html-validate	@pi-r/html-validate	3
html-minifier-terser	@pi-r/html-minifier-terser	7
html-minifier	@pi-r/html-minifier	7
svgo	@pi-r/svgo	9

CSS

postcss	@pi-r/postcss	5
clean-css	@pi-r/clean-css	6
csso	@pi-r/csso	7
stylelint	@pi-r/stylelint	3
sass	@pi-r/sass	1

JS

@babel/core	@pi-r/babel	4
eslint	@pi-r/eslint	3
prettier	@pi-r/prettier	6
rollup	@pi-r/rollup	2
terser	@pi-r/terser	7
uglify-js	@pi-r/uglify-js	8

These plugins can be configured using a plain object in `settings.transform`. Import maps¹ are available for plugins which resolve imports through the file system. Other non-builtin transpilers can similarly be integrated by defining a custom function.

- NPM custom package
- Local file using `module.exports` (e.g. `“.cjs”`)
- Local plain file with single function (e.g. `“.js”`)
- Inline function

Tip: More advanced plugins can be written when installed through NPM.

2.5.3 Breakdown

Plugins are simply options pass-through calls to a `context` wrapper method. The only part which might not be intuitive is consuming an existing source map and then saving it for further processing.

Code

Listing 17: @pi-r/clean-css

```

1 import type { ITransformSeries, RawSourceMap } from "@e-mc/types/lib/document";
2
3 import type * as cc from "clean-css";
4
5 export default function transform(context: typeof cc, value: string, options:
6   ↳ ITransformSeries<cc.OptionsOutput>) {
7   context = options.upgrade(context, __dirname);
8   const sourceMap = options.sourceMap;
9   const baseConfig = options.toBaseConfig(/* true */); // Use "false" for only
10  ↳ outputConfig
11   let map: RawSourceMap<string> | undefined;
12   if (baseConfig.sourceMap === false) {
13     sourceMap.reset();
14   }
15   else if (map = sourceMap.map) {
16     baseConfig.sourceMap = true;
17   }
18   const result = new context(baseConfig).minify(value, map);
19   if (result) {
20     if (result.sourceMap) {
21       sourceMap.nextMap("clean-css", result.styles, result.sourceMap.toString());
22     }
23     return result.styles;
24   }
25 }

```

¹ settings.transform.imports

Hint: There are only three lines of relevant *TypeScript* being used to check for upgrade compatibility. Local file “.cjs” transformers offer the same exact functionality.

Comments

1. Typings (optional)
2. *none*
3. *none*
4. *none*
5. **context** = require(“clean-css”), **value** = source code, **options** = *TransformSeries* instance
6. When calling process (*cwd*) uses a different major package version (optional)
7. Main *sourceMap* from previous consumer
8. Applies **options.external** AND **options.outputConfig** to **options.baseConfig** (optional)
9. *none*
10. Delete current *sourceMap* as requested using `sourceMap.reset`
11. *none*
12. *none*
13. Check if there is an existing *sourceMap* and pass it through
14. *none*
15. *none*
16. Call package transform method with **baseConfig** and **value**
17. Check if method succeeded
18. Check if a *sourceMap* was generated
19. Pass *sourceMap* output values to `sourceMap.nextMap` chain method
20. *none*
21. Return modified transformed *source code*

Important: Some plugins have a two-step transformation process (*e.g. rollup*) and use **outputConfig** separately. It is generally used for inline transformers as their **baseConfig**.

2.5.4 Settings

All packages can be customized per authenticated username using the `settings.users` block. The base settings are then searched until something is found.

```
{
  "document": {
    "chrome": {
      "handler": "@pi-r/chrome",
      "eval": {
        "function": true, // Enable inline functions
        "absolute": false, // Enable absolute paths to local files
        "template": false, // Enable external template functions
        "userconfig": false // Enable functions inside local files from user queries
      },
      "settings": {
        "directory": {
          "package": "../packages" // Override built-in plugins (base directory/ + users/
↪username/? + posthtml.js)
        },
        "users": {
          "username": {
            "html": {
              "posthtml": { /* Same */ }
            },
            "css": {
              "postcss": { /* Same */ }
            }
          }
        }
      }
    }
  }
}
```

Warning: `eval` is a global setting for all users. Any unsafe execution is disabled by default.

Using built-in transformer

External plugins per package have to be pre-installed from NPM and may not be available for auto-install.

```
{
  "document": {
    "chrome": {
      "settings": {
        "transform": {
          "html": {
            "posthtml": { // npm i @pi-r/posthtml
              "transform": {
                "plugins": [
                  ["posthtml-doctype", { "doctype": "HTML 5" } ]],

```

(continues on next page)

(continued from previous page)

```

        ["posthtml-include", { "root": "./", "encoding": "utf-8" }],
        "posthtml-attrs-sorter",
        ["htmlnano", { "collapseWhitespace": "conservative" }]
      ]
    },
    "transform-output": {
      "directives": [
        { "name": "?php", "start": "<", "end": ">" }
      ]
    }
  },
  "prettier": { // npm i @pi-r/prettier
    "beautify": {
      "parser": "html",
      "printWidth": 120,
      "tabWidth": 4
    }
  },
  "css": {
    "postcss": { // npm i @pi-r/postcss
      "transform": {
        "plugins": [
          "autoprefixer",
          ["cssnano", { "preset": ["cssnano-preset-default", { "discardComments
↪": false }]] ]
        }
      }
    }
  }
}

```

Using inline function Page 24, 1

The suffix “**-output**” is used to create the variable options.outputConfig.

```

{
  "document": {
    "chrome": {
      "settings": {
        "transform": {
          "js": {
            "terser": { // npm i @pi-r/terser
              "minify-example": "async (terser, value, options, require) => await terser.
↪minify(value, options.outputConfig).code;", // Asynchronous

```

(continues on next page)

¹ this = NodeJS.process

(continued from previous page)

```

    "minify-example-output": {
      "keep_classnames": true // "minify-example-output"
    }
  },
  "css": {
    "sass": { // npm i @pi-r/sass
      "sass-example": "(sass, value, options, resolve, require) => resolve(sass.
↪renderSync({ ..options.outputConfig, data: value })).css);", // Synchronous
      "sass-example-output": {
        "outputStyle": "compressed",
        "sourceMap": true,
        "sourceMapContents": true
      }
    }
  }
}

```

Caution: Arrow functions are supported for convenience. Explicit **function** use is recommended.

Using local file

```

{
  "document": {
    "chrome": {
      "settings": {
        "transform": {
          "js": {
            "@babel/core": { // npm i @pi-r/babel
              "es5-example": "./es5.js", // JS extension uses Function constructor
              "es5-example-output": {
                "presets": ["@babel/preset-env"]
              },
              "es5-debug": "./es5-debug.cjs", // CJS extension loaded using "require"
              "es5-debug-output": {
                "presets": ["@babel/preset-env"]
              }
            }
          }
        }
      }
    }
  }
}

```

Listing 18: es5.js (function only)

```
function (context, value, options, resolve, require) {
  const path = require("path");
  context.transform(value, options.outputConfig, function (err, result) {
    resolve(!err && result ? result.code : "");
  });
}
```

Listing 19: es5-debug.cjs

```
const path = require("path");
let ID = 0;

module.exports = async function (context, value, options) {
  return await context.transform(`/ * ${ID++} */` + value, options.outputConfig).code;
}
```

Using custom package

You can create or use a package from NPM which will behave like a built-in transformer. The only difference is the context parameter being set to the *Document* module.

```
{
  "document": {
    "chrome": {
      "settings": {
        "transform": {
          "js": {
            /* Override built-in transformer */
            "@babel/core": {
              /* npm i babel-custom */
              "npm-example": "npm:babel-custom", // function(Document, value, options) {
↳const context = require("babel-custom"); }
              "npm-example-output": {
                "presets": ["@babel/preset-env"]
              },
              /* OR */
              "npm-example-output": "npm:babel-custom-output" // Not recommended (npm i
↳babel-custom-output)
            },
          },
        },
        "css": {
          /* npm i sass-custom */
          "sass-custom": {
            "transform": { // options.baseConfig
              "sourceMap": true
            }
          }
        }
      }
    }
  }
}
```

(continues on next page)

(continued from previous page)

```

    }
  }
}

```

Attention: The setting name has to match the NPM package name.

Using page template

The same concept can be used inline anywhere using a `script` tag with the **type** attribute set to “text/template”. The script template will be completely removed from the final output.

```

<script type="text/template" data-chrome-template="js::@babel/core::es5-example">
  async function (context, value, options) {
    const options = { ...options.toBaseConfig(), presets: ["@babel/preset-env"],
    ↪sourceMaps: true };
    const result = await context.transform(value, options);
    if (result) {
      if (result.map) {
        options.sourceMap.nextMap("babel", result.code, result.map);
      }
      return result.code;
    }
  }
}
</script>

```

Listing 20: Alternate

```
{
  "selector": "",
  "type": "js",
  "template": {
    "module": "@babel/core",
    "identifier": "es5-example",
    "value": "async function (context, value, options) { /* Same */ }" // Arrow functions.
    ↪not supported
  }
}
```

Attention: Using **data-chrome-template** requires the setting `eval.template = true`.

2.6 Appending source

You can **append** or **prepend** a sibling element (*not child*) to be processed as a typical script or link element.

```
<html>
<head>
  <title></title>
  <!-- Google Analytics -->
  <script>
    window.ga=window.ga||function(){(ga.q=ga.q||[]).push(arguments)};ga.l=+new Date;
    ga('create', 'UA-XXXXX-Y', 'auto');
    ga('send', 'pageview');
  </script>
  <script async src='https://www.google-analytics.com/analytics.js'></script>
  <!-- End Google Analytics -->
</head>
<body>
</body>
</html>
```

The equivalent command through a configuration file.¹

```
[
  {
    "selector": "title",
    "type": "append/script", // All tags except "html"
    "textContent": "\\nwindow.ga=window.ga||function(){(ga.q=ga.q||[]).push(arguments)};\\n
    ↪ga.l=+new Date;\\nga('create', 'UA-XXXXX-Y', 'auto');\\nga('send', 'pageview');\\n"
  },
  {
    "selector": "title",
    "type": "append/js", // prepend/css
    "download": false, // Explicit "false"
  }
]
```

(continues on next page)

¹ All commands in relation to the base type are supported.

(continued from previous page)

```

    "attributes": {
      "src": "https://www.google-analytics.com/analytics.js", // CSS: href (required)
      "async": null
    }
  }
]

```

2.6.1 Build Options

useOriginalHtmlPage = false

The current state of the DOM is sent including any updates made with JavaScript. Every element being modified will have an auto-generated locator **UUID**.

useOriginalHtmlPage = true

Will attempt to parse the page as it stored on file. Dynamic content (*e.g. php*) that create additional elements are not supported. Scripts which insert elements as the page is loading should be performed after parsing the document. Errors can also occur with <p> tags when they contain block-level elements. If you are having problems using this option then make sure your page is a valid [HTML5](#) document. As a last resort you can try adding an element “**id**” to directly inject the content.

2.7 Miscellaneous

2.7.1 Merge conflicts

Only one command per element is supported (*except data sources*) when using [sqd.config](#). The last selector always takes precedence except when **mergeType** is defined.¹

Listing 21: “ordinal”: 1 | index.html*

```

[
  {
    "selector": "img#picture1",
    "attributes": { "alt": "Picture 1" },
    "commands": ["png@"]
  },
  {
    "selector": "img#picture2",
    "attributes": { "loading": "lazy", "alt": "Picture 2" },
    "commands": ["webp%"]
  }
]

```

¹ When using server hosted directory based sqd.config.

Listing 22: “ordinal”: 2 | **/*.html?output=prod

```
[
  {
    "selector": "img",
    "mergeType": "under",
    "hash": "sha256", // Merged
    "attributes": { "alt": "Picture 1" }, // No effect
    "commands": ["jpeg@"] // No effect
  },
  /* OR */
  {
    "selector": "img",
    "mergeType": "preserve",
    "hash": "sha256", // Merged
    "attributes": { "loading": "lazy", "alt": "Picture 1" }, // Merged as "Picture 1"
    "commands": ["jpeg@"] // No effect
  },
  /* OR */
  {
    "selector": "img",
    "mergeType": "over",
    "hash": "sha256", // Merged
    "attributes": { "loading": "lazy", "alt": "Picture 2" }, // Merged as "Picture 2"
    "commands": ["jpeg@"] // All images will be JPEG
  },
  /* OR */
  {
    "selector": "img",
    "mergeType": "none",
    "hash": "sha256", // No effect
    "attributes": { "alt": "Picture 1" }, // No effect
    "commands": ["jpeg@"] // No effect
  }
]
```

2.7.2 Image dimensions

NPM	JPEG	GIF	PNG	WebP	BMP	TIFF	PSD	ICO	AVIF	HEIC	HEIF
image-size ²	x	x	x	x	x	x	x	x	x	x	x
probe-image-size ³	x	x	x	x	x	x	x	x	x	x	x
jimp ⁴	x	x	x		x	x					

Attention: Element **width** OR **height** including **max-width** (px) AND **max-height** (px) being set will not be processed due to the likeliness of distortion.

² npm i image-size

³ npm i probe-image-size

⁴ Jimp is not recommended for detecting image dimensions.

```
{
  "selector": "img",
  "filename": "probe.png",
  /* OR */
  "mimeType": "image/png", // "image/unknown"
  "attributes": {
    "width": "detect",
    "height": "detect",
    "loading": "lazy" // Optional
  }
}
```

Listing 23: Source

```

```

Listing 24: Output

```

```

2.7.3 Element content

Listing 25: *http://localhost:3000/project/index.html?className=active*

```
{
  "selector": "p.inactive",
  "type": "replace",
  "textContent": "<b>content</b>",
  "attributes": {
    "class": "{{className}}"
  }
}
```

Listing 26: Source

```
<p class="inactive">paragraph 1</p>
<p>paragraph 2</p>
<p class="inactive">paragraph 3</p>
```

Listing 27: Output

```
<p class="active"><b>content</b></p>
<p>paragraph 2</p>
<p class="active"><b>content</b></p>
```

Caution: Editing local files with complex *nested tag content* is not recommended. Try using an element “**id**” when there are errors building.

2.7.4 Manifest

The web app manifest⁵ is downloaded by default and possibly modified when searching for embedded image assets:

```
{
  "icons": [],
  "shortcuts": [{ "icons": [] }],
  "screenshots": []
}
```

Tip: Image compression is supported.

It is not integrated with the *NodeJS* build system and the images might not appear as expected due to URL rewriting. You can disable this behavior by using either command:

```
{
  "selector": "link[rel=manifest]",
  "download": false
}
```

Listing 28: Inline

```
<head>
  <link rel="manifest" href="/manifest.json" data-chrome-file="ignore">
</head>
```

2.7.5 squared

Added in version 5.2.0:

- *AssetCommand* property **mergeType** option value “*preserve*” was created.

Added in version 5.1.5:

- *AssetCommand* property **attributes** hash map values can be replaced using search **{{params}}** syntax.

⁵ <https://web.dev/articles/add-manifest>

2.7.6 @pi-r/chrome

Added in version 0.6.4:

- *NPM* package **image-size** is optionally supported for image dimensions.

2.8 Watch

File watching is available with **copy** methods and uses HTTP HEAD requests to determine modifications. You can watch any file served with HTTP including files from another server.

Hot module replacement is only available for `<link>` and `` elements. It is disabled by default due to possible conflicts with preloaded JavaScript.

2.8.1 Using JSON config

```
{
  "selector": "link",
  "type": "css", // html | js | image
  "watch": {
    "interval": 100, // Time between HTTP requests (ms)
    "interval": "1m",
    "start": "Apr 29, 2024 5:00:00 PM", // Empty is immediate
    "expires": "1w 1d 1h 1m 1s", // Empty is never (includes "start")
    "main": false // Will rebuild the entire bundle
    "id": "watch1", // Resets an existing watch when it is the first active socket
    "reload": true, // Uses server defaults
    /* OR */
    "reload": {
      "socketId": "111-111-111", // Use same id to reload multiple pages
      "port": 80,
      "secure": false, // Requires TLS/SSL key and cert
      "module": false, // "img" and "link" only
      "always": false // Ignore errors
    }
  },
  "process": [
    "bundle",
    "lint",
    "minify"
  ]
}
```

2.8.2 Using copyTo options

```
squared.copyTo("/local/user/www", {
  watch: true,
  saveAs: {
    script: {
      pathname: "../js",
      process: ["es5", "es5-minify"],
      watch: true
    },
    link: {
      pathname: "css",
      filename: "bundle.css",
      watch: { interval: 500 }
    }
  }
});
```

2.8.3 Using JWT authentication

```
{
  "watch": {
    "settings": {
      "users": {
        "username": {
          "http://localhost:3000/index.html": { "interval": 100 }, // Order of precedence
          "http://localhost:3000/**/*": { /* Same */},
          "/path/to/project/file": { /* Same */}, // Local
          "/path/to/project/**/*": { /* Same */},
          "image/png": { /* Same */}, // MIME
          "image/*": { /* Same */}
        }
      }
    }
  }
}
```

```
squared.auth('eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9...');
squared.copyTo("/local/user/www", {
  watch: true,
  saveAs: {
    script: { watch: true }
  }
});
```

2.8.4 data-chrome-watch

Listing 29: JSON^{Page 35, 1}

```
<script
  src="/common/util.js"
  data-chrome-watch='{ "interval": 100, "expires": "1w 1d 1h 1m 1s", "reload": { "port": 443, "secure": true } }'>
</script>
```

Listing 30: interval :: expires :: reload

```
<link rel="stylesheet" href="/common/util.css" data-chrome-watch="1000::1h 30m::111-111-111:8080[module|secure|always]">
```

Listing 31: Settings

```
<link rel="stylesheet" href="/common/util.css" data-chrome-watch="~">
<!-- OR -->
<link rel="stylesheet" href="/common/util.css" data-chrome-watch="~::~~::[secure|always]">
```

Tip: “~” can be used between “::” for default server value.

2.8.5 Build Options

useOriginalHtmlPage = true

HTML only has partial watch support since most local modifications will alter the original element index position stored in memory. Inline source `<script>` and `<style>` cannot be edited when they are part of a bundle.

Elements that are configured (e.g. `dataSource`) are not editable as the original request values will be used on a reload.

```
{
  "selector": "p",
  "attributes": {
    "class": "active"
  }
}
```

Listing 32: Source

```
<p>content</p>
```

Listing 33: Build output

```
<p class="active">content</p>
```

¹ data-chrome-watch='interval': 100, "expires": "1w 1d 1h 1m 1s", "reload": { "port": 443, "secure": true }'

Listing 34: Edit source

```
<p class="inactive" style="display: none;">content</p>
```

Listing 35: Watch output

```
<p class="active" style="display: none;">content</p>
```

Attention: If you configure an `` tag (*or any tag group*) then you cannot add or remove other `` elements without adding an element “**id**” to every element in the group.

2.9 Broadcast

Console messages (*stdout*) can be sent to the browser console instead through the [DevTools](#) protocol.

2.9.1 Interface

```
interface LogStatus {
  name: string;
  type: number;
  value: string;
  timeStamp: number;
  from: string;
  sessionId: string;
  duration?: number;
  source?: string;
}

interface BroadcastResponse {
  event: "broadcast" | "close" | "error";
  socketId?: string | string[];
  type?: string;
  encoding?: BufferEncoding;
  value?: unknown; // Payload
  timeStamp?: number;
  status?: LogStatus[];
  errors?: string[];
  options?: unknown;
}
```


2.9.2 Example usage

```
squared.broadcast(result => { console.log(result.value); }, "111-111-111"); // Messages
↳ from "project-1" project
squared.broadcast(result => { console.log(result.value); }, { socketId: "222-222-222",
↳ socketKey: "socket_id" }); // Messages sent from another channel (default is "socketId"
↳ ")

await squared.copyTo("/path/to/project", {
  projectId: "project-1",
  log: { useColor: true }, // Chromium
  broadcastId: "111-111-111" // Specific use alias for "socketId"
});
```

2.10 Finalize

You can exclude unnecessary processing files using the dataset attribute in these tags:

- script
- link
- style

Other elements can be excluded only through a configuration file.

Listing 36: Inline

```
<script src="/dist/squared.js" data-chrome-file="exclude"></script>
<script src="/dist/squared.base.js" data-chrome-file="exclude"></script>
<script src="/dist/chrome.framework.js" data-chrome-file="exclude"></script>
<script data-chrome-file="exclude">
  squared.setFramework(chrome);
  squared.save();
</script>
```

There is a simpler way to exclude the same tags by using an HTML comment block when inside the <head> element.¹

Listing 37: Comment block

```
<head>
  <title></title>
  <!-- EXCLUDE: start -->
  <meta charset="utf-8"> <!-- not excluded -->
  <script src="/dist/squared.js"></script>
  <script src="/dist/squared.base.js"></script>
  <script src="/dist/chrome.framework.js"></script>
  <script>
    squared.setFramework(chrome);
    squared.save();
  </script>
  <style>
```

(continues on next page)

¹ Cannot be used with "stripCommentsAndCDATA = true".

(continued from previous page)

```
body {  
  max-width: 1920px;  
}  
</style>  
<!-- EXCLUDE: end -->  
<link rel="stylesheet" href="/common/util.css">  
</head>
```

You can similarly prevent any element from being downloaded or transformed using the value “**ignore**”.

```
<iframe src="https://www.google.com/maps" data-chrome-file="ignore"></iframe>
```

Note: **JSON** (*yaml*) is the preferred way to configure commands due to the limitations of storing data inline using the `data-chrome-` dataset namespace. Any assets inside the configuration file will override any settings either inline or from JavaScript.

- <https://github.com/jimp-dev/jimp#readme>
- `npm i @pi-r/jimp`

Note: *Jimp* is used as the reference implementation for an **Image** module.

3.1 Example configuration

Listing 1: squared.json

```
{
  "image": {
    "handler": "@pi-r/jimp",
    "webp": "webp-custom", // IImage handler for "image/webp" (npm i webp-custom)
    "avif": "avif-custom", // IImage handler for "image/avif" (npm i avif-custom)
    "settings": {
      "jimp": {
        "rotate_clockwise": false
      },
      "webp": {
        "path": "/path/to/libwebp" // Optional
      }
    }
  }
}
```

Tip: *Jimp* rotation is counter-clockwise. Use `{-45}` to achieve a *45-degree* clockwise rotation.

Image conversion can be achieved using the `commands` array property in a *FileAsset* object.

```
{
  "selector": "p > img",
  "saveTo": "/static/generated", // Does not replace original image
  "commands": [
    "png(800x600){45}", // width: 800px; height: 600px; rotate: 45deg;
    "jpeg(50,50)!sepia" // left: 50px; top: 50px; method: sepia;
```

(continues on next page)

(continued from previous page)

```
]
}
```

3.2 Supported formats

Format	R	W
png	x	x
jpeg	x	x
webp	x	x
bmp	x	x
gif	x	x
tiff	x	

3.2.1 WebP

Library	R	W	NPM
dwebp	x		dwebp-bin ¹
cwebp		x	cwebp-bin ¹
gif2webp		x	gif2webp-bin
webpmux	x	x	node-webpmux

There can be transparency issues for *WebP* animated transformations due to the *WebP* compression algorithm. **node-webpmux** is only used to extract the raw data from the *WebP* image and to reconstruct the frames.

Note: **libwebp**¹ is supported locally for *WebP* transforms through `settings.webp.path`.

3.3 Command syntax

Placing an “@” symbol after the **format** (e.g. *png@*) will replace the original file inside the project. Using the “%” symbol will choose the smaller of the two files.

All segments are optional except **format**. Outer groupings and inner brackets are required.

- *format*
- | *choose one* |
 - @
 - %
- ~size(*n*)(*w*|*x*) (*chrome only*)
- (minSize(*n*,0) , maxSize(*n*,*)?)

¹ <https://developers.google.com/speed/webp/download>

- (width(*n|auto*) x height(*n|auto*) [*bilinear|bicubic|hermite|bezier*]? ^(*cover|contain|scale*)?[*left|center|right|top|middle|bottom*]? #background-color?)
- (left(+|-*n*) , top(+|-*n*) | cropWidth(*n*) x cropHeight(*n*))
- { ...rotate(*n|-n*) #background-color? }
- | *choose one* |
 - opacity(*0.0-1.0*)
 - jpeg_quality(*0-100*)
 - webp_quality(*0-100?[photo|picture|drawing|icon|text]?[0-100]?*)²
- !method³
- !method(*1*, “string_arg2”, [*1*, *2*], true, { “a”: *1*, “b”: “\” }, ...args?)⁴

3.4 Example commands

Methods use simple bracket matching and does not fully check inside quoted strings. Unescaped “\” with unpaired (“}” or “[”) will fail to parse.

```
webp(50000)(800x600[bezier]^contain[right|bottom]#FFFFFF)(-50,50|200x200){45,-45,215,315
↪#FFFFFF}|0.5||100[photo][75]||!sepia

webp!opacity(0.5)
webp!op(0.5)

webp~800w(800x600)
webp~2x(1024x768)
```

Tip: The “~” is used to target the attribute.

3.5 Method aliases^{Page 41, 5}

² cwebp options: -q -preset -near_lossless

³ Method with no arguments. (e.g. sepia)

⁴ No expressions or native objects.

⁵ <https://github.com/jimp-dev/jimp/tree/main/packages/jimp#methods>

autocrop	au	background	bg	backgroundQuiet	bq
blit	bt	blur	bl	brightness	br
circle	ci	color	co	colorType	ce
composite ⁶	cp	contain ⁷	ct	contrast	cn
convolute	cl	cover	cv	crop	cr
cropQuiet	cq	deflateLevel	dl	deflateStrategy	ds
displace	dp	dither565	dt	fade	fa
filterType	ft	fishEye	fe	flip	fl
gaussian	ga	greyscale	gr	invert	in
mask	ma	mirror	mi	normalize	no
opacity	op	opaque	oq	pixelate	px
posterize	po	resize	re	rgba	rg
rotate	ro	scale	sc	scaleToFit	sf
sepia	se	shadow	sh	threshold	th

3.6 Compression

Tinify web service is used for image compression⁸. The first 500 images are free each month with a developer API key.

Listing 2: squared.json

```
{
  "compress": {
    "tinify": {
      "api_key": "*****", // Default API key (optional)
      "proxy": ""
    }
  }
}
```

```
{
  "selector": "p > img",
  "compress": [
    {
      "format": "png", // png | jpeg | webp
      "plugin": "tinify",
      "options": {
        "apiKey": "*****" // Overrides settings
      }
    }
  ]
}
```

Other formats can be compressed similarly using [imagemin](#).

```
{
  "selector": "p > img",
```

(continues on next page)

⁶ srcOver | dstOver | multiply | add | screen | overlay | darken | lighten | hardLight | difference | exclusion

⁷ left - 1 | center - 2 | right - 4 | top - 8 | middle - 16 | bottom - 32

⁸ png | jpeg | webp

(continued from previous page)

```

"compress": [
  {
    "format": "png",
    "plugin": "imagemin-pngquant", // npm i imagemin-pngquant
    "options": {
      "quality": [0.6, 0.8]
    }
  }
]
}

```

If no exact match is found with format then all plugins will be applied to the unknown image. Multiple plugins of the same format will be processed in a series.

3.7 data-chrome-commands

Listing 3: img | video | audio | source | track | object | embed | iframe

```

 <!-- data:image/webp;base64 -->

```

You can use image commands with **saveTo** (directory) on any element where the image is the primary display output.

Listing 4: img | object | embed | iframe

```



```

Tip: Multiple transformations use “:.” as the separator.

Transformations are given a *UUID* filename except when “@” or “%” are used. Leaving **data-chrome-file** empty will save the transformations to the current image directory.

4.1 Interface

```
import type { DbDataSource } from "../db/interface";

interface CloudDatabase extends Omit<DbDataSource, "parallel" | "withCommand" | "usePool"
→"> {
  source: "cloud";
  service: string;
  id?: string;
  params?: unknown;
}
```

```
interface CloudStorage {
  service: string;
  credential: unknown;
  bucket?: string;
  admin?: CloudStorageAdmin;
  upload?: CloudStorageUpload;
  download?: CloudStorageDownload;
}

interface CloudStorageAdmin extends CloudStorageACL {
  emptyBucket?: boolean;
  configBucket?: {
    create?: unknown;
    policy?: unknown;
    website?: {
      indexPage?: string;
      errorPage?: string;
      indexPath?: string;
      errorPath?: string;
    };
    retentionPolicy?: unknown;
  };
  recursive?: boolean;
  preservePath?: boolean;
}

interface CloudStorageAction {
```

(continues on next page)

(continued from previous page)

```

    pathname?: string;
    filename?: string;
    minStreamSize?: number | string;
    chunkSize?: number | string;
    chunkLimit?: number;
    flags?: number;
    active?: boolean;
    overwrite?: boolean;
    admin?: CloudStorageAdmin;
}

interface CloudStorageUpload extends CloudStorageACL, CloudStorageAction {
    buffer?: Buffer | null;
    contentType?: string;
    metadata?: Record<string, string>;
    tags?: Record<string, string> | false;
    options?: unknown;
    fileGroup?: [Buffer | string, string, string?][];
    localStorage?: boolean;
    endpoint?: string;
    all?: boolean;
}

interface CloudStorageACL {
    publicRead?: boolean | 0;
    acl?: string;
}

interface CloudStorageDownload extends CloudStorageAction {
    keyname?: string;
    versionId?: string;
    options?: unknown;
    deleteObject?: unknown;
    waitStatus?: boolean;
}

```

Added in version 0.9.0:

- *CloudStorageAction* property **chunkSize** | **chunkLimit** for parallel multipart operations.
- *CloudStorageDownload* property **options** to customize the provider download client.
- *CloudStorageDownload* property **keyname** for file to be downloaded and subsequently renamed to **filename**.

4.1.1 Shared properties

Storage

```
{
  "cloudStorage": [{
    "service": "aws", // Built-in alias | NPM package name
    "bucket": "nodejs-001",
    "credential": { /* service-interface */ }

    "admin": {
      "publicRead": true, // Public access (before upload #3)
      /* OR */
      "acl": "service-value", // ACL access permissions

      "emptyBucket": true, // Delete all objects (before upload #1)
      "recursive": false, // Default is "true" (emptyBucket)

      "configBucket": {
        "create": { /* service-interface */ }, // New bucket (before upload #2)
        "retentionPolicy": { /* service-interface */ }, // Bucket initialization (before_
↪upload #4)
        "policy": { /* service-interface */ }, // Modify policy (after upload)

        "website": { // Main HTML page only
          "indexPath": "index.html", // Usage varies by service
          "errorPage": "404.html",
          "indexPath": "home.html",
          "errorPath": "errors/404.html"
        }
      }
    },
    "upload": {
      "active": false, // Will not overwrite ACL
      "active": true, // Rewrites "src" to storage location + Will overwrite ACL (public-
↪read)
      "localStorage": false, // Remove current file from archive or local disk

      "all": true, // Include descendants + transforms + torrents

      "pathname": "2024", // nodejs-001/2024/picture.png
      "filename": "picture.png", // Choose a different filename for bucket
      "overwrite": false, // If exists then picture_{1,2,3}.png
      /* OR */
      "overwrite": true, // Always use current filename

      "contentType": "image/png", // Metadata has higher precedence (default is
↪"application/octet-stream")

      "minStreamSize": 0, // Always use readable stream
      "minStreamSize": "512mb", // Detect when to use readable stream (not limited to_
↪2gb)
      "minStreamSize": -1, // Prefer transfer by Buffer (small files)

```

(continues on next page)

(continued from previous page)

```

    "chunkSize": "8mb", // Part size of a parallel upload operation
    "chunkLimit": 4, // Concurrent parts uploading

    "endpoint": "http://hostname/nodejs-001" // Required when different from credential
  },
  "download": {
    "filename": "alternate.png", // Required
    "versionId": "12345", // Retrieve a previous file snapshot

    "chunkSize": "32mb", // Part size of a parallel download operation
    "chunkSize": 33554432, // 32 * 1024 * 1024
    "chunkLimit": 4, // Concurrent parts downloading

    "active": false,
    "overwrite": false, // If local file exists then skip download
    /* OR */
    "active": true, // Always write file or replace local file when same extension

    "waitStatus": true, // Delay build until file is completely downloaded

    "pathname": "download/images", // Relative only (base directory/pathname)
    /* OR */
    "preservePath": false, // Use base directory
    "preservePath": true, // Use asset directory

    "keyname": "", // bucket/alternate.png to download/images/alternate.png
    "keyname": "picture.png", // bucket/picture.png to download/images/alternate.png

    "deleteObject": true, // Delete from bucket after successful download
    "deleteObject": { /* service-interface */ }
  }
}
}
}

```

Tip: Any properties in `admin.configBucket.website` set to `true` uses the upload HTML page element.

Database

```

{
  "dataSource": { // DbDataSource
    "source": "cloud",
    "service": "aws", // Built-in alias | NPM package name
    "credential": { /* service-interface */ },

    // Excluding "parallel" | "withCommand" | "usePool"
  }
}

```

4.1.2 Admin

Auth

Internal use of these libraries that do not require credentials validation during service client API initialization can disable this behavior through settings. There are also cases where an unsupported authorization scheme is necessary which has not been implemented.

Caution: These are global settings and affect every connection per service.

Listing 1: squared.cloud.json

```
{
  "settings": {
    "aws": {
      "auth": {
        "storage": true, // Default behavior
        "database": false // Explicit to disable
      }
    }
  }
}
```

Added in version 0.9.0:

- Credentials validation bypass settings in **squared.cloud.json (1.4.0)** were created.

Storage

Service	CLOUD_UPLOAD_STREAM	CLOUD_UPLOAD_CHUNK	CLOUD_DOWNLOAD_CHUNK
aws	X	X	
aws-v3	X	X	
azure	X	X	X
gcp	X	X	X
ibm	X	X	
minio	X		
oci	X	X	

Caution: Setting `process.env.EMC_CLOUD_UPLOAD_BUFFER = "true"` will enable the legacy behavior for *Document* based uploads.

Stream

Streaming was enabled by default due to its lower memory usage requirements. It is slower for small file transfers which is typical for a static web page.

Tip: Setting `upload.minStreamSize = -1` will disable streaming for the current request.

Listing 2: Buffer

```
const aws = require("@pi-r/aws");
aws.CLOUD_UPLOAD_STREAM = false;
```

Warning: Reading a buffer from disk has **2gb** file size limit.

Chunk

Parallel transfers were enabled by default to accommodate large files. The old behavior is used when **chunkSize** is empty and will open one request per file.

Listing 3: Sequential

```
const azure = require("@pi-r/azure");
azure.CLOUD_UPLOAD_CHUNK = false;
azure.CLOUD_DOWNLOAD_CHUNK = false;
```

Note: Chunking is only active when the upload file size is greater than **chunkSize**.

4.2 Amazon Web Services

- `npm i @pi-r/aws`

4.2.1 Storage

- <https://aws.amazon.com/s3>

Interface

```
import type { ConfigurationOptions } from "aws-sdk/lib/core";

interface AWSSStorage extends CloudStorage {
  service: "aws";
  credential: string | AWSSStorageCredential;
  bucket: string;
}

interface AWSSStorageCredential extends ConfigurationOptions {
  profile?: string;
  fromPath?: string;
}
```

Authentication

- Credentials
- Access Keys
- Provider Chain

Listing 4: using process.env

```
AWS_ACCESS_KEY_ID = "";
AWS_SECRET_ACCESS_KEY = "";
AWS_SESSION_TOKEN = ""; // Optional

AWS_SDK_LOAD_CONFIG = "<any>"; // AWS.SharedIniFileCredentials
AWS_SHARED_CREDENTIALS_FILE = "<default>"; // Default is "~/.aws/credentials"
AWS_PROFILE = "<default>";

AWS_WEB_IDENTITY_TOKEN_FILE = ""; // AWS.TokenFileWebIdentityCredentials

AWS_CONTAINER_CREDENTIALS_RELATIVE_URI = ""; // AWS.RemoteCredentials
AWS_CONTAINER_CREDENTIALS_FULL_URI = "";
```

```
{
  "dataSource": {
    "credential": "main", // squared.cloud.json
    /* OR */
    "credential": {
      "accessKeyId": "*****",
      "secretAccessKey": "*****",
      "region": "ap-northeast-1",
      "sessionToken": ""
    },
    /* OR */
    "credential": {
      "profile": "work-account"
    },
    /* OR */
```

(continues on next page)

(continued from previous page)

```

    "credential": {
      "fromPath": "./config.json" // Current request only (read permission)
    }
  }
}

```

Example usage

- [S3 Client API](#)
- [Canned ACL](#)

```

{
  "selector": "html", // Any resource
  "cloudStorage": [{
    "service": "aws",
    "bucket": "nodejs-001",
    "credential": {/* Authentication */},
    "admin": {
      "publicRead": true, // Bucket + uploaded objects
      /* OR */
      "publicRead": 1, // Bucket only (s3::ListBucket*)
      /* OR */
      /* Will modify existing bucket (equivalent policy) + uploaded objects */
      "acl": "private", // Canned ACL - Bucket

      "configBucket": {
        "policy": {
          "Policy": "", // s3.putBucketPolicy
          /* OR */
          "ACL": "authenticated-read", // s3.putBucketAcl
          /* OR */
          "PublicAccessBlockConfiguration": { // s3.putPublicAccessBlock
            "BlockPublicAcls": false,
            "BlockPublicPolicy": false,
            "IgnorePublicAcls": false,
            "RestrictPublicBuckets": false
          }
        },
      },
      "tags": { // s3.putBucketTagging
        "Tagging": {
          "TagSet": [{
            "Key": "key_1",
            "Value": "value_1"
          }]
        }
      },
      "tags": { // s3.deleteBucketTagging
        "Tagging": {
          "TagSet": []
        }
      }
    }
  ]
}

```

(continues on next page)

(continued from previous page)

```

    },
    "website": { // s3.putBucketWebsite
        "indexPage": "index.html", // IndexDocument
        "errorPage": "404.html" // ErrorDocument
    },
    /* During call to "upload" */
    "create": { // s3.createBucket
        "ACL": "public-read",
        "CreateBucketConfiguration": {
            "LocationConstraint": "ap-northeast-3"
        }
    },
    "cors": {
        "CORSRules": [/* Rule */], // s3.putBucketCors{CORSConfiguration}
        "CORSRules": [] // s3.deleteBucketCors
    },
    "lifecycle": {
        "Rules": [/* Rule */], // s3.putBucketLifecycleConfiguration
        ↪ {LifecycleConfiguration}
        "Rules": [] // s3.deleteBucketLifecycle
    },
    "retentionPolicy": {/* DefaultRetention */} // s3.putObjectLockConfiguration
    ↪ {ObjectLockConfiguration[Rule]}
    },
    "upload": { // s3.upload
        "publicRead": true, // Will overwrite primary options.ACL
        /* OR */
        "acl": "private" // Canned ACL - Object

        "options": { // PutObjectRequest
            "ContentType": "text/html", // Primary object only
            "ACL": "private", // All objects
            "Metadata": {/* Record<string, string> */}, // All objects except when "metadata
            ↪ " is defined
            "ExpectedBucketOwner": ""
        },

        "chunkSize": "5mb", // Same as "partSize"
        "chunkLimit": 4, // Same as "queueSize"

        /* Primary object only */
        "metadata": {
            "Content-Type": "text/html; charset=UTF-8",
            "Content-Encoding": "gzip",
            "Expires": "Wed, 21 Oct 2015 07:28:00 GMT"
        },
        "tags": { // s3.putObjectTagging{TagSet}
            "key_1": "value",
            "key_2": "value"
        },
        "tags": {}, // s3.deleteObjectTagging

```

(continues on next page)

(continued from previous page)

```

    "tags": false
  },
  "download": {
    /* s3.getObject */
    "options": { // GetObjectRequest
      "ExpectedBucketOwner": "",
      "IfMatch": ""
    }
    /* Same as interface */
  }
}
}]
}

```

4.2.2 Database

- <https://aws.amazon.com/dynamodb>

Interface

```

import type { ServiceConfigurationOptions } from "aws-sdk/lib/service";
import type { BatchGetItemInput, Key, QueryInput, ScanInput, UpdateItemInput } from "aws-
  ↪ sdk/clients/dynamodb";

interface AWSDatabaseQuery extends CloudDatabase {
  source: "cloud";
  service: "aws";
  credential: string | AWSDatabaseCredential;
  key?: string | Key;
  query?: QueryInput | Key[];
  params?: BatchGetItemInput | ScanInput;
  options?: Record<string, unknown>;
  update?: UpdateItemInput;
}

interface AWSDatabaseCredential extends AWSStorageCredential,
  ↪ ServiceConfigurationOptions { /* Empty */}

```

Authentication

```
/* Same as Storge */
```

```
AWS_REGION = "";
```

```

{
  "dataSource": {
    "credential": "main", // squared.cloud.json
    /* OR */
    "credential": { /* Same as Storage */}
  }
}

```

(continues on next page)

(continued from previous page)

```
}
}
```

Example usage

- DynamoDB Client API
- Query

```
{
  "selector": "h1",
  "type": "text",
  "dataSource": {
    "source": "cloud",
    "service": "aws",
    "credential": { /* Authentication */ },
    "table": "demo",

    "query": { // db.query
      "KeyConditionExpression": "#name = :value",
      "ExpressionAttributeNames": { "#name": "id" },
      "ExpressionAttributeValues": { ":value": "1" }
    },
    /* OR */
    "query": [{ "name": { "S": "value" } }], // db.batchGet
    ↪ {BatchGetItemInput[RequestItems]}
    "query": "<empty>", // db.scan
    "params": { // BatchGetItemInput | ScanInput
      "ProjectionExpression": "name"
    },
    /* OR */
    "key": { // db.get{GetItemInput[Key]}
      "a": "value",
      "b": 1
    },
    /* OR */
    "key": "c", // { "c": 1 }
    "id": 1,

    "value": "<b>${title}</b>: ${description}",

    "update": { // db.update
      "TableName": "<table>",
      "Key": "<key>"
    },
    "key": "c" // Same as item being retrieved
  }
}
```

4.2.3 @pi-r/aws

Added in version 0.7.0:

- **CLOUD_UPLOAD_STREAM** attribute in *ICloudServiceClient* was enabled.
- **CLOUD_UPLOAD_CHUNK** attribute in *ICloudServiceClient* was enabled.
- **chunkSize** | **chunkLimit** in *CloudStorageUpload* were implemented.
- **configBucket.tags** using *PutBucketTaggingRequest* was implemented.
- **configBucket.cors** using *CORSConfiguration* was implemented.
- **configBucket.lifecycle** using *LifecycleConfiguration* was implemented.

Removed in version 0.7.0:

- **AWS_SESSION_TOKEN** is not used when validating credentials.
- **AWS_DEFAULT_REGION** is not recognized in *AWS NodeJS SDK*.
- *AWSDatabaseQuery* property **partitionKey** is a duplicate of **key**.

Added in version 0.6.2:

- Default providers *web identity token* and *remote credentials* environment variables are detected.
- **AWS_SDK_LOAD_CONFIG** is enabled with any non empty value.

Deprecated since version 0.6.2:

- DynamoDB using *AWS.config.loadFromPath* to parse **fromPath** will be revised in **0.7.0**.

4.3 Amazon Web Services

- `npm i @pi-r/aws-v3`

4.3.1 Storage

- <https://aws.amazon.com/s3>

Interface

```
import type { AwsAuthInputConfig } from "@aws-sdk/middleware-signing";
import type { S3ClientConfig } from "@aws-sdk/client-s3";

interface AWSStorage extends CloudStorage {
  service: "aws-v3";
  credential: string | AWSStorageCredential;
  bucket: string;
}

interface AWSBaseCredential extends AwsAuthInputConfig {
  provider?: {
    http?: unknown;
    ini?: unknown;
  };
}
```

(continues on next page)

(continued from previous page)

```

    cognitoIdentity?: unknown;
    cognitoIdentityPool?: unknown;
    temporaryCredentials?: unknown;
    webToken?: unknown;
    containerMetadata?: unknown;
    instanceMetadata?: unknown;
    process?: unknown;
    tokenFile?: unknown;
    sso?: unknown;
    env?: unknown;
    nodeProviderChain?: unknown;
  };
}

interface AWSSStorageCredential extends S3ClientConfig, AWSBaseCredential { /* Empty */}

```

Authentication

- Credentials
- Standardized
- Providers

Listing 5: using process.env

```

/* Same as AWS */

AWS_CREDENTIAL_EXPIRATION = ""; // fromEnv
AWS_CREDENTIAL_SCOPE = "";

AWS_CONTAINER_CREDENTIALS_RELATIVE_URI = ""; // fromHttp
AWS_CONTAINER_CREDENTIALS_FULL_URI = "";
AWS_CONTAINER_AUTHORIZATION_TOKEN_FILE = "";
AWS_CONTAINER_AUTHORIZATION_TOKEN = "";

```

```

{
  "dataSource": {
    "credential": "main", // squared.cloud.json
    /* OR */
    "credential": {
      "credentials": {
        "accessKeyId": "*****", // Legacy V2
        "secretAccessKey": "*****",
        "sessionToken": "", // Optional
        "expiration": "2025-1-1",
        "credentialScope": ""
      },
      "region": "ap-northeast-1"
    },
    /* OR */
    "credential": {

```

(continues on next page)

(continued from previous page)

```

"provider": {
  "http": true, // AWS_CONTAINER
  "http": {
    "awsContainerCredentialsRelativeUri": "<AWS_CONTAINER_CREDENTIALS_RELATIVE_URI>"
  },
  "awsContainerCredentialsFullUri": "<AWS_CONTAINER_CREDENTIALS_FULL_URI>",
  "awsContainerAuthorizationToken": "<AWS_CONTAINER_AUTHORIZATION_TOKEN>",
  "awsContainerAuthorizationTokenFile": "<AWS_CONTAINER_AUTHORIZATION_TOKEN_FILE>"
},
/* OR */
"ini": { /* params */ },
/* OR */
"cognitoIdentity": { /* params */ },
/* OR */
"cognitoIdentityPool": { /* params */ },
/* OR */
"temporaryCredentials": { /* params */ },
/* OR */
"webToken": { /* params */ },
/* OR */
"containerMetadata": { /* params */ },
/* OR */
"instanceMetadata": { /* params */ },
/* OR */
"process": { /* params */ },
/* OR */
"tokenFile": { /* params */ },
/* OR */
"sso": { /* params */ },
/* OR */
"env": true, // AWS_ACCESS_KEY_ID + AWS_SECRET_ACCESS_KEY + AWS_SESSION_TOKEN
/* OR */
"ini": true, // AWS_SDK_LOAD_CONFIG = "1"
/* ALSO */
"nodeProviderChain": true, // Optional
"nodeProviderChain": { /* params */ }
},
"region": "ap-northeast-1"
}
}
}

```

Example usage

- S3 Client API
- Canned ACL

```
{
  "selector": "html", // Any resource
  "cloudStorage": [{
    "service": "aws-v3",
    "bucket": "nodejs-001",
    "credential": { /* Authentication */ },
    "admin": {
      /* Same as AWS */
      "configBucket": {
        "policy": {
          "Policy": "", // s3.PutBucketPolicyCommand
          /* OR */
          "ACL": "authenticated-read", // s3.PutBucketAclCommand
          /* OR */
          "PublicAccessBlockConfiguration": { // s3.PutPublicAccessBlockCommand
            "BlockPublicAcls": false,
            "BlockPublicPolicy": false,
            "IgnorePublicAcls": false,
            "RestrictPublicBuckets": false
          }
        },
        "tags": { // s3.PutBucketTaggingCommand
          "Tagging": {
            "TagSet": [{
              "Key": "key_1",
              "Value": "value_1"
            }]
          }
        },
        "tags": { // s3.DeleteBucketTaggingCommand
          "Tagging": {
            "TagSet": []
          }
        },
        "website": { // s3.PutBucketWebsiteCommand
          "indexPage": "index.html", // IndexDocument
          "errorPage": "404.html" // ErrorDocument
        },
        /* During call to "upload" */
        "create": { // s3.CreateBucketCommand
          "ACL": "public-read",
          "CreateBucketConfiguration": {
            "LocationConstraint": "ap-northeast-3"
          }
        },
        "cors": {
          "CORSRules": [ /* Rule */ ], // s3.PutBucketCorsCommand{CORSConfiguration}
          "CORSRules": [] // s3.DeleteBucketCorsCommand
        }
      }
    }
  ]
}
```

(continues on next page)

(continued from previous page)

```

    },
    "lifecycle": {
      "Rules": [/* Rule */, // s3.PutBucketLifecycleConfigurationCommand
↪{BucketLifecycleConfiguration}
      "Rules": [] // s3.DeleteBucketLifecycleCommand
    },
    "retentionPolicy": {/* DefaultRetention */} // s3.
↪PutObjectLockConfigurationCommand{ObjectLockConfiguration[Rule]}
  }
},
"upload": {/* Same as AWS */},
"download": {
  /* Same as AWS */
  "minStreamSize": -1 // No effect
}
}]
}

```

4.3.2 Database

- <https://aws.amazon.com/dynamodb>

Interface

```

import type { DynamoDBClientConfig, QueryCommandInput, ScanCommandInput } from "@aws-sdk/
↪client-dynamodb";
import type { BatchGetCommandInput, TranslateConfig, UpdateCommandInput } from "@aws-sdk/
↪lib-dynamodb";
import type { NativeAttributeValue } from "@aws-sdk/util-dynamodb";

interface AWSDatabaseQuery extends CloudDatabase {
  source: "cloud";
  service: "aws-v3";
  credential: string | AWSDatabaseCredential;
  key?: string | AttributeKey;
  query?: QueryCommandInput | ObjectMap<NativeAttributeValue>[];
  params?: BatchGetCommandInput | ScanCommandInput;
  update?: UpdateCommandInput;
}

interface AWSDatabaseCredential extends DynamoDBClientConfig, AWSBaseCredential {
  translateConfig?: TranslateConfig;
}

type AttributeKey = Record<string, NativeAttributeValue>;

```


Authentication

```
{
  "dataSource": {
    "credential": "main", // squared.cloud.json
    /* OR */
    "credential": { /* Same as Storage */ }
  }
}
```

Example usage

- DynamoDB Client API
- Query

```
{
  "selector": "h1",
  "type": "text",
  "dataSource": {
    "source": "cloud",
    "service": "aws-v3",
    "credential": { /* Authentication */ },
    "table": "demo",

    "query": { // db.QueryCommand
      "KeyConditionExpression": "#name = :value",
      "ExpressionAttributeNames": { "#name": "id" },
      "ExpressionAttributeValues": { ":value": "1" }
    },
    /* OR */
    "query": [{ "name": { "S": "value" } }], // db.BatchGetCommand
    ↪ {BatchGetCommandInput[RequestItems]}
    "query": "<empty>", // db.ScanCommand
    "params": { // BatchGetCommandInput | ScanCommandInput
      "ProjectionExpression": "name"
    },
    /* OR */
    "key": { // db.GetCommand{GetCommandInput[Key]}
      "a": "value",
      "b": 1
    },
    /* OR */
    "key": "c", // { "c": 1 }
    "id": 1,

    "value": "<b>${title}</b>: ${description}",

    "update": { // db.UpdateCommand
      "TableName": "<table>",
      "Key": "<key>"
    },
  },
}
```

(continues on next page)

(continued from previous page)

```
"key": "c" // Same as item being retrieved
}
}
```

4.3.3 @pi-r/aws-v3

Added in version 0.7.0:

- **CLOUD_UPLOAD_STREAM** attribute in *ICloudServiceClient* was enabled.
- **CLOUD_UPLOAD_CHUNK** attribute in *ICloudServiceClient* was enabled.
- **chunkSize** | **chunkLimit** in *CloudStorageUpload* were implemented.
- **configBucket.tags** using *PutBucketTaggingRequest* was implemented.
- **configBucket.cors** using *CORSConfiguration* was implemented.
- **configBucket.lifecycle** using *BucketLifecycleConfiguration* was implemented.
- NPM dependency **@pi-r/aws** was replaced with **@pi-r/aws-lib**.

Removed in version 0.7.0:

- **AWS_DEFAULT_REGION** is not recognized in *AWS NodeJS SDK*.
- Unofficial credential properties from V2 (e.g. *profile*).
- *AWSDatabaseQuery* property **partitionKey** is a duplicate of property **key**.

Added in version 0.6.2:

- Credential providers “from” methods through the property **provider** were implemented.
- Credential **expiration** as a date string in the property **credentials** is supported.

4.4 Microsoft Azure

- `npm i @pi-r/azure`

Tip: The alias *az* can be used in place of “*azure*” for the **service** property.

4.4.1 Storage

- <https://azure.microsoft.com/en-us/free/storage>

Interface

```
interface AzureStorage extends CloudStorage {
  service: "azure" | "az";
  credential: string | AzureStorageCredential;
  bucket: string;
}

interface AzureStorageCredential {
  accountName?: string;
  accountKey?: string;
  connectionString?: string;
  sharedAccessSignature?: string;
}
```

API

```
type Metadata = Record<string, string>;
type Tags = Record<string, string>;
```

Authentication

- Credentials

Listing 6: using process.env

```
AZURE_TENANT_ID = ""; // DefaultAzureCredential
AZURE_CLIENT_ID = "";
AZURE_CLIENT_SECRET = "";
```

```
{
  "dataSource": {
    "credential": "main", // squared.cloud.json
    /* OR */
    "credential": {
      "accountName": "nodejs", // +1 password option (required)
      "accountKey": "*****",
      /* OR */
      "connectionString": "DefaultEndpointsProtocol=http;AccountName=nodejs;
↪AccountKey=*****;BlobEndpoint=http://127.0.0.1:10000/nodejs;",
      /* OR */
      "sharedAccessSignature": "https://nodejs.blob.core.windows.net/bucket?...", //↪
↪Full URL with SAS token
      /* OR */
      // DefaultAzureCredential from @azure/identity
    }
  }
}
```

Listing 7: using process.env

```
AZURE_STORAGE_ACCOUNT = "";
AZURE_STORAGE_KEY = "";
AZURE_STORAGE_CONNECTION_STRING = "";
AZURE_STORAGE_SAS_TOKEN = "";
```

Note: These are not official *Azure* environment variables and require `process.env.apply = true` in *squared.json*.

Example usage

- Storage Blob Client API

```
{
  "selector": "html", // Any resource
  "cloudStorage": [{
    "service": "azure",
    "bucket": "nodejs-001",
    "credential": { /* Authentication */ },
    "admin": {
      "publicRead": true, // Same as "blob" (access)
      /* OR */
      "acl": "container",

      "configBucket": {
        "website": { // azure.setProperties{staticWebsite}
          "indexPath": "index.html", // indexDocument
          "indexPath": "home.html", // defaultIndexDocumentPath
          "errorPath": "errors/404.html" // errorDocument404Path
        },
        /* During call to "upload" */
        "create": { // azure.create
          "access": "container", // Same as "acl"
          "metadata": { /* Metadata */ }
        },
        "retentionPolicy": [{ // azure.setAccessPolicy
          "id": "policy1",
          "accessPolicy": {
            "expiresOn": "new Date('2025-01-01')", // Permission "coerce" required when
            ↪ through web service
            "permissions": "none",
            "startsOn": "new Date('2024-01-01')"
          }
        }]
      },
      "upload": {
        /* Not supported */
        "publicRead": false,
        "acl": "none",
```

(continues on next page)

(continued from previous page)

```

"options": { // BlobBlobUploadOptions
  "blobHTTPHeaders": {
    "blobContentType": "text/html"
  },
  /* All objects except when "metadata" or "tags" is defined */
  "metadata": { /* Metadata */},
  "tags": { /* Tags */}
},

/* Primary object only */
"metadata": { /* Metadata */},
"tags": { /* Tags */},

/* azure.uploadFile{maxSingleShotSize} */
"chunkSize": "32mb", // Aligned to 1mb
"chunkLimit": 4 // Same as "concurrency"
},
"download": {
  /* azure.downloadToFile */
  "chunkSize": "2gb", // Set to at least 2gb
  "versionId": "2011-03-09T01:42:34.9360000Z", // Alias for "snapshot" (optional)

  /* azure.downloadToBuffer{blockSize} */
  "chunkSize": "256mb", // Aligned to 1mb
  "chunkLimit": 4, // Same as "concurrency"
  "options": { // BlobDownloadToBufferOptions
    "concurrency": 4
  },
}

"deleteObject": { /* ContainerDeleteMethodOptions */} // azure.delete
}
}]
}

```

4.4.2 Database

- <https://azure.microsoft.com/en-us/products/cosmos-db>

Interface

```

import type { CosmosClientOptions, FeedOptions, PartitionKey, PatchRequestBody,
↳ RequestOptions, SqlQuerySpec } from "@azure/cosmos";

interface AzureDatabaseQuery extends CloudDatabase {
  source: "cloud";
  service: "azure" | "az";
  credential: string | AzureDatabaseCredential;
  name: string;
  table: string;
}

```

(continues on next page)

(continued from previous page)

```

query?: string | SqlQuerySpec;
params?: unknown[];
partitionKey?: PartitionKey;
options?: FeedOptions | RequestOptions;
update?: PatchRequestBody;
storedProcedureId?: string;
}

interface AzureDatabaseCredential extends CosmosClientOptions {
  username?: string;
  password?: string;
  tenantId?: string;
  clientId?: string;
}

```

Authentication

- Connection
- Azure AD

```

{
  "dataSource": {
    "credential": "main", // squared.cloud.json
    /* OR */
    "credential": {
      "endpoint": "https://nodejs.documents.azure.com:443",
      "key": "*****"
    },
    /* OR */
    "credential": {
      "endpoint": "https://nodejs.documents.azure.com:443",
      "username": "nodejs", // Azure AD
      "password": "*****",
      "tenantId": "azure-id", // Optional with AZURE_TENANT_ID
      "clientId": "cosmos-id" // Optional with AZURE_CLIENT_ID
    }
  }
}

```

Listing 8: using process.env

```
AZURE_COSMOS_ENDPOINT = "";
AZURE_COSMOS_KEY = "";
```

Note: These are not official *Azure* environment variables and require `process.env.apply = true` in *squared.json*.

Example usage

- Cosmos Client API
- Query
- JSON Patch

```
{
  "selector": "h1",
  "type": "text",
  "dataSource": {
    "source": "cloud",
    "service": "azure",
    "credential": { /* Authentication */ },
    "name": "nodejs", // Database name
    "table": "demo",

    "id": "1",
    "partitionKey": "Pictures", // Optional
    "partitionKey": ["Pictures", "Azure"],
    "options": { /* RequestOptions */ },
    /* OR */
    "storedProcedureId": "spGetItems",
    "params": [1, "value"],
    "partitionKey": "Pictures", // Optional
    "options": { /* RequestOptions */ },
    /* OR */
    "query": "SELECT * FROM c WHERE c.id = '1'", // Calls "readAll" when not defined
    "query": { // SqlQuerySpec
      "query": "SELECT * FROM c WHERE c.lastName = @lastName AND c.address.state = ↵
↵ @addressState",
      "parameters": [
        { "name": "@lastName", "value": "Wakefield" },
        { "name": "@addressState", "value": "CA" }
      ]
    },
    "options": { /* FeedOptions */ },

    "value": "<b>${title}</b>: ${description}",

    "update": { /* PatchRequestBody */ }, // JSON Patch
    "id": "1", // Same as item being retrieved
    "partitionKey": "Pictures"
```

(continues on next page)

(continued from previous page)

```
}  
}
```

4.4.3 @pi-r/azure

Added in version 0.7.0:

- **CLOUD_UPLOAD_STREAM** attribute in *ICloudServiceClient* was enabled.
- **CLOUD_UPLOAD_CHUNK** attribute in *ICloudServiceClient* was enabled.
- **CLOUD_DOWNLOAD_CHUNK** attribute in *ICloudServiceClient* was enabled.
- **chunkSize** | **chunkLimit** in *CloudStorageUpload* were implemented.
- **chunkSize** | **chunkLimit** in *CloudStorageDownload* were implemented.

Added in version 0.6.2:

- Identity authentication with Azure AD (**aadCredentials**) was implemented.

4.5 Google Cloud Platform

- **npm i @pi-r/gcp**

Tip: The alias *gcloud* can be used in place of “*gcp*” for the **service** property.

4.5.1 Storage

- <https://cloud.google.com/storage>
- <https://firebase.google.com/products/storage>

Note: **npm i firebase** && **npm i firebase-admin** (optional)

Interface

```
import type { StorageOptions } from "@google-cloud/storage";  
import type { FirebaseOptions } from "@firebase/app";  
  
interface GCPStorage extends CloudStorage {  
  service: "gcp" | "gcloud";  
  credential: string | GCPStorageCredential;  
  bucket: string;  
}  
  
interface GCPStorageCredential extends StorageOptions, FirebaseOptions {  
  product?: "firebase";  
}
```


API

```
type Document = Record<string, any>;
type Metadata = Record<string, any>;
```

Authentication

- Credentials

Listing 9: using process.env

```
GOOGLE_APPLICATION_CREDENTIALS = "";
```

```
{
  "dataSource": {
    "credential": "main", // squared.cloud.json
    /* OR */
    "credential": {
      "keyFilename": "./gcp.json", // Path to JSON credentials
      "projectId": "nodejs"
    },
    /* OR */
    "credential": {
      "projectId": "nodejs",
      "credentials": {
        "client_email": "*****",
        "private_key": "*****",
        "type": "service_account", // Optional
        "project_id": "nodejs"
      }
    },
    /* OR */
    "credential": {
      "projectId": "nodejs", // When using GOOGLE_APPLICATION_CREDENTIALS
      "scopes": "https://www.googleapis.com/auth/cloud-platform" // Optional
    },
    /* OR */
    "credential": {
      "projectId": "nodejs",
      "apiKey": "*****",
      "authDomain": "<project-id>.firebaseapp.com",
      /* OR */
      "product": "firebase" // When using GOOGLE_APPLICATION_CREDENTIALS
    }
  }
}
```

Example usage

- Storage Client API
- Firebase Client API
- Class ACL

```
{
  "selector": "html", // Any resource
  "cloudStorage": [{
    "service": "gcp",
    "bucket": "nodejs-001",
    "credential": { /* Authentication */ },
    "admin": {
      "publicRead": true, // New buckets only
      /* OR */
      "acl": "private", // See "policy"

      "configBucket": {
        "policy": { // MakeBucketPrivateOptions
          "acl": "private", // makePrivate + includeFiles + projectPrivate
          "acl": "projectPrivate", // makePrivate + allUsers (delete) +
↪ allAuthenticatedUsers (delete)
          "acl": "authenticatedRead", // projectPrivate + allAuthenticatedUsers:READER
          "acl": "publicRead", // makePublic + includeFiles
          "acl": "publicReadWrite", // publicRead + allUsers:WRITER
          "acl": [{ "entity": "allUsers", "role": "READER" } /* add */, { "entity":
↪ "allAuthenticatedUsers" } /* delete */ ], // Custom

          /* Unofficial aliases - gcp.setMetadata{iamConfiguration} */
          "acl": "bucketAccessUniform", // Enable uniform bucket-level access
          "acl": "bucketAccessACL" // Revert uniform bucket-level access (within 90 days)
        },
        "tags": { // gcp.setMetadata{labels}
          "key_1": "value",
          "key_2": "value"
        },
        "tags": {}, // gcp.setMetadata{labels=null}
        "website": { // gcp.setMetadata{website}
          "indexPage": "index.html", // mainPageSuffix
          "errorPage": "404.html" // notFoundPage
        },
        /* During call to "upload" */
        "create": { // gcp.createBucket{CreateBucketRequest}
          "location": "ASIA",
          "storageClass": "STANDARD" // "NEARLINE" | "COLDLINE" | "ARCHIVE"
        },
        "lifecycle": [ /* LifecycleRule */ ], // gcp.addLifecycleRule
        "lifecycle": [ /* LifecycleRule */, false ], // options.append = false
        "lifecycle": [], // Delete all rules
        "cors": [ /* Cors */ ], // gcp.setCorsConfiguration
        "cors": [], // Delete all rules
        "retentionPolicy": 86400 // gcp.setRetentionPeriod (seconds)
      }
    }
  ]
}
```

(continues on next page)

(continued from previous page)

```

    }
  },
  "upload": {
    "publicRead": true, // Will not clobber existing ACLs
    "publicRead": 0, // Remove ACL without affecting other ACLs
    /* OR */
    "acl": "authenticatedRead", // "bucketOwnerFullControl" | "bucketOwnerRead" |
    ↪ "private" | "projectPrivate" | "publicRead"

    /* gcp.save */
    "options": { // UploadOptions
      "contentType": "text/html",
      "predefinedAcl": "publicRead", // Supplementary are public
      "metadata": { /* Metadata */ } // All objects except when "metadata" is defined
    },

    /* gcp.uploadFileInChunks{chunkSizeBytes} */
    "chunkSize": "8mb", // Aligned to 1mb
    "chunkLimit": 5, // Same as "concurrencyLimit"
    "options": {
      "contentType": "image/png",
      "metadata": { /* Metadata */ },
      /* UploadFileInChunksOptions - shared */
      "headers": {
        "Authorization": "",
        "x-goog-user-project": ""
      },
      "maxQueueSize": 5,
      "concurrencyLimit": 5
    },

    /* firebase.uploadBytes */
    "options": { // UploadMetadata
      "contentType": "text/html",
      "customMetadata": { /* Metadata */ } // All objects except when "metadata" is
    ↪ defined
    },

    /* Primary object only */
    "metadata": {
      "key": "value",
      "key_delete": null
    }
  },
  "download": {
    /* gcp.createReadStream */
    "chunkSize": "", // Empty
    "chunkLimit": 1, // Will only stream when value is 1

    /* gcp.downloadFileInChunks{chunkSizeBytes} */
    "chunkSize": "32mb", // Aligned to 1mb
    "chunkLimit": 5, // Same as "concurrencyLimit"
  }
}

```

(continues on next page)

(continued from previous page)

```

    "options": {
      "concurrencyLimit": 5
    }
    /* Same as interface - gcp.download + firebase.getDownloadURL */
  }
}
}

```

Attention: *Firebase* does not support any bucket operations except `emptyBucket` and `metadata`.

4.5.2 Database

Interface

```

import type { GoogleAuthOptions } from "google-auth-library";
import type { PathType } from "@google-cloud/datastore";
import type { entity } from "@google-cloud/datastore/build/src/entity";

interface GCPDatabaseQuery extends CloudDatabase {
  source: "cloud";
  service: "gcp" | "gcloud";
  credential: string | GCPDatabaseCredential;
  product?: "firestore" | "bigquery" | "bigtable" | "datastore" | "spanner" | "firebase"
  ↪";
  id?: string | string[];
  params?: string | unknown[] | Document;
  database?: string;
  updateType?: 0 | 1 | 2 | 3;
  columns?: string[];
  keys?: DatastoreKey | DatastoreKey[];
  kind?: string | string[];
  orderBy?: unknown[][];
}

interface GCPDatabaseCredential extends GoogleAuthOptions { /* Empty */}

type DatastoreKey = string | PathType[] | entity.KeyOptions;

```

Authentication

```

{
  "dataSource": {
    "credential": "main", // squared.cloud.json
    /* OR */
    "credential": { /* Same as Storage */ },
    /* OR */
    "credential": {

```

(continues on next page)

(continued from previous page)

```

    "projectId": "nodejs",
    "apiKey": "*****",
    "authDomain": "<project-id>.firebaseapp.com",
    "databaseURL": "https://<database-name>.firebaseio.com" // Required
  }
}

```

Example usage

Firestore

- <https://cloud.google.com/firestore>
- Client API

```

{
  "selector": "h1",
  "type": "text",
  "dataSource": {
    "source": "cloud",
    "service": "gcp",
    "product": "firestore",
    "credential": { /* Authentication */ },
    "table": "demo",

    "id": "8Qnt83DSNW0eNykpuzcQ", // fs.collection(table).doc
    /* OR */
    "id": ["8Qnt83DSNW0eNykpuzcQ", "aahIEBE4qHM73JE7jom3"], // fs.getAll (table/id)
    "options": { /* ReadOptions */ },
    /* OR */
    "params": ["column", "column.sub"], // fs.collection(table).findNearest
    "query": [1, 2],
    "options": {
      "limit": 1000, // Optional
      "distanceMeasure": "EUCLIDEAN"
    },
  },
  /* OR */
  "query": [ // fs.collection(table)
    ["where", "group", "==", "Firestore"],
    ["where", "id", "==", "8Qnt83DSNW0eNykpuzcQ"],
    ["findNearest", "column", [1, 2], { "limit": 1000, "distanceMeasure": "EUCLIDEAN" } ],
  ],
  ["limitToLast", 2],
  ["orderBy", "title", "asc"]
],
"query": [
  ["whereAnd", // Unofficial
    ["group", "==", "Firestore"],
    ["id", "==", "8Qnt83DSNW0eNykpuzcQ"]
  ],

```

(continues on next page)

(continued from previous page)

```

    ["limitToLast", 2]
  ],
  "query": [
    ["whereOr", // Unofficial
      ["id", "==", "8Qnt83DSNW0eNykpuzcQ"],
      ["id", "==", "aahiEBE4qHM73JE7jom3"]
    ],
    ["orderBy", "title", "asc"]
  ],
  "orderBy": [
    ["title", "asc"]
  ],
  "value": "<b>${title}</b>: ${description}",

  "updateType": 0, // 0 - update{exists} | 1 - create | 2 - set | 3 - set{merge}
  "update": { /* Document */ }, // fs.update
  "update": {
    "key1": "__delete__", // FieldValue.delete()
    "key2": "__increment__", // FieldValue.increment(1)
    "key2": "__increment<number>__", // FieldValue.increment(number)
    "key3": "__serverTimestamp__" // FieldValue.serverTimestamp()
  },
  "id": "8Qnt83DSNW0eNykpuzcQ" // Same as item being retrieved
}

```

- endAt
- endBefore
- limit
- limitToLast
- offset
- orderBy
- select
- startAfter
- startAt
- where
- **whereAnd**
- **whereOr**
- withConverter

BigQuery

- <https://cloud.google.com/bigquery>
- Client API

Note: `npm i @google-cloud/bigquery`

```

{
  "selector": "h1",
  "type": "text",
  "dataSource": {
    "source": "cloud",
    "service": "gcp",
    "product": "bigquery",
    "credential": { /* Authentication */ },

    "database": "nodejs", // Dataset (optional)
  }
}

```

(continues on next page)

(continued from previous page)

```

"table": "demo", // Destination table (optional)

"query": "SELECT name, count FROM `demo.names_2014` WHERE gender = 'M' ORDER BY_
↪count DESC LIMIT 10", // bq.getQueryResults

"params": { "name": "value" },
"params": ["arg0" /* ? */ , "arg1" /* ? */ ],
"options": { /* IQuery */ },

/* Result: { "item_src": "bigquery.png", "item_alt": "BigQuery" } */
"value": {
  "src": "item_src",
  "alt": "item_alt"
},

"update": "SELECT name, state FROM `bigquery-public-data.usa_names.usa_1910_current`_
↪LIMIT 10" // "database" | "database" + "table" (bq.setMetadata)
}
}

```

Datastore

- <https://cloud.google.com/datastore>
- Client API

Note: `npm i @google-cloud/datastore`

```

{
  "selector": "h1",
  "type": "text",
  "dataSource": {
    "source": "cloud",
    "service": "gcp",
    "product": "datastore",
    "credential": { /* Authentication */ },

    "keys": "task", // ds.get
    "keys": ["task", "sampletask1"], // PathType[]
    "keys": { // KeyOptions
      "namespace": "nodejs",
      "path": ["task", "sampletask3"]
    },
    "keys": ["task", ["task", "sampletask2"]],
    /* OR */
    "name": "<namespace>", // With "kind" (optional)
    "kind": "Task", // ds.runQuery (at least one parameter)
    "kind": ["Task1", "Task2"],
    "query": [
      ["filter", "done", "=", false],

```

(continues on next page)

(continued from previous page)

```

    ["filter", "priority", ">=", 4],
    ["order", "priority", { "descending": true }]
  ],
  "options": { /* RunQueryOptions */},

  "value": "`<b>${this.title}</b>: ${this.description} (${this.total * 2})`", //
↪Function template literal

  "update": { /* Document */}, // ds.save
  "keys": "task", // Same as item being retrieved
  /* OR */
  "kind": "Task",
  "query": [ /* Same */]
}

```

- end
- filter
- groupBy
- hasAncestor
- limit
- offset
- order
- select
- start

Bigtable

- <https://cloud.google.com/bigtable>
- Client API

Note: `npm i @google-cloud/bigtable`

```

{
  "selector": "h1",
  "type": "text",
  "dataSource": {
    "source": "cloud",
    "service": "gcp",
    "product": "bigtable",
    "credential": { /* Authentication */},
    "name": "nodejs", // Instance
    "table": "demo",

    "id": "rowKey1", // bt.get
    "columns": ["column1", "column2"],
    /* OR */
    "id": "<empty>", // bt.createReadStream

    "query": { /* Filter */}, // Overrides "filter" in GetRowOptions
    "options": { /* GetRowOptions */},

    "value": "{{if not expired}}<b>${title}</b>: ${description}{{else}}Expired{{end}}",

    "update": { /* Document */}, // bt.save

```

(continues on next page)

(continued from previous page)

```

    "id": "rowKey1" // Same as item being retrieved
  }
}

```

Spanner

- <https://cloud.google.com/spanner>
- Client API

Note: `npm i @google-cloud/spanner`

```

{
  "selector": "h1",
  "type": "text",
  "dataSource": {
    "source": "cloud",
    "service": "gcp",
    "product": "spanner",
    "credential": { /* Authentication */ },
    "name": "nodejs", // Instance

    "database": "sample", // Required
    "options": {
      "databasePool": { /* session-pool.SessionPoolOptions */ },
      "databaseQuery": { /* protos.IQueryOptions */ }
    },

    "table": "demo", // sp.table.read
    "columns": ["col1", "col2"], // Overrides "columns" in ReadRequest
    "query": { // ReadRequest
      "columns": [],
      "keys": []
    },
    "options": {
      "tableRead": { /* TimestampBounds */ }
    },
    /* OR */
    "table": "<empty>", // sp.run
    "query": "SELECT 1", // DML
    "query": { "sql": "SELECT 1", "params": { "p1": 0, "p2": 1 } } // ExecuteSqlRequest

    "dynamic": true, // element.innerHTML (with tags)
    "dynamic": false, // element.textContent

    "table": "demo", // sp.table.update
    "update": { /* Document */ },
    "updateType": 0, // 0 - update | 1 - insert | 2 - replace
    "options": {
      "tableUpdate": { /* UpdateRowsOptions */ }
    }
  }
}

```

(continues on next page)

(continued from previous page)

```

    },
    /* OR */
    "table": "<empty>", // sp.runUpdate
    "update": "SELECT 1",
    "update": { "sql": "SELECT 1", "params": { "p1": 0, "p2": 1 } }
  }
}

```

Realtime Database

- <https://firebase.google.com/products/realtime-database>
- Client API

Note: `npm i firebase` && `npm i firebase-admin` (optional)

```

{
  "selector": "h1",
  "type": "text",
  "dataSource": {
    "source": "cloud",
    "service": "gcp",
    "product": "firebase",
    "credential": { /* Authentication */ },

    "query": "path/to/ref", // rd.child
    /* OR */
    "query": "path/to/ref", // rd.query
    "orderBy": [
      ["orderByChild", "path/to/child"],
      ["startAfter", 5, "name"],
      ["limitToFirst", 1]
    ],

    "viewEngine": { "name": "ejs" },
    "value": "<b><%= title %></b>: <%= description %>",

    "update": { /* Document */ }, // rd.update
    "query": "path/to/ref" // Same as item being retrieved (rd.child)
  }
}

```

- | | | | |
|-------------|----------------|-------------------|--------------|
| • endBefore | • limitToFirst | • orderByKey | • startAt |
| • endAt | • limitToLast | • orderByPriority | • startAfter |
| • equalTo | • orderByChild | • orderByValue | |

4.5.3 @pi-r/gcp

Added in version 0.8.0:

- Storage action **download** using **createReadStream** with *chunkLimit* was implemented.
- *Firestore* method **findNearest** as a *VectorQuery* and *Query* is supported.

Added in version 0.7.1:

- *Firestore* methods **where** | **orderBy** | **select** supports using *FieldPath* params.

Added in version 0.7.0:

- **CLOUD_UPLOAD_STREAM** attribute in *ICloudServiceClient* was enabled.
- **CLOUD_UPLOAD_CHUNK** attribute in *ICloudServiceClient* was enabled.
- **CLOUD_DOWNLOAD_CHUNK** attribute in *ICloudServiceClient* was enabled.
- **chunkSize** | **chunkLimit** in *CloudStorageUpload* were implemented.
- **chunkSize** | **chunkLimit** in *CloudStorageDownload* were implemented.
- Storage **configBucket.tags** using *Metadata* was implemented.
- Storage **configBucket.cors** using *Cors* was implemented.
- Storage **configBucket.lifecycle** using *LifecycleRule* was implemented.
- *Firestore* property **update** supports using *FieldValue* <"delete" | "increment" | "serverTimestamp"> methods.
- *Firestore* property **update** supports using property **updateType** enum values.

Removed in version 0.7.0:

- *GCPStorageCredential* no longer extends **CreateBucketRequest**.

Added in version 0.6.3:

- *Firestore* property **id** supports multiple document references.
- *Firestore* property **query** supports using *Filter* <"and" | "or"> conditional groups for *where*.

Added in version 0.6.2:

- *GoogleAuthOptions* properties **authClient** and **credentials** were not detected during credential validation.
- *Datastore* method **createQuery** with "namespace" and "kind" parameter is supported.

4.6 IBM Cloud

- **npm i @pi-r/ibm**

4.6.1 Storage

- <https://www.ibm.com/products/cloud-object-storage>

Note: Uses [S3¹](#) compatibility API (AWS v2) and signature **iam**.

Interface

```
import type { ConfigurationOptions } from "ibm-cos-sdk/lib/config-base";

interface IBMStorage extends CloudStorage {
  service: "ibm"
  credential: string | IBMStorageCredential;
  bucket: string;
}

interface IBMStorageCredential extends ConfigurationOptions {
  apiKeyId: string;
  serviceInstanceId: string;
  region: string;
  endpoint?: string;
}
```

Authentication

- Credentials

```
{
  "dataSource": {
    "credential": "main", // squared.cloud.json
    /* OR */
    "credential": {
      "apiKeyId": "*****",
      "serviceInstanceId": "*****",
      "region": "jp-tok",
      /* OR */
      "endpoint": "https://s3.<region>.cloud-object-storage.appdomain.cloud"
    }
  }
}
```

¹ <https://cloud.ibm.com/docs/cloud-object-storage?topic=cloud-object-storage-compatibility-api>

Example usage

- <https://cloud.ibm.com/apidocs/cos/cos-compatibility?code=node>
- [AWS S3 v2](#)

```
{
  "selector": "html", // Any resource
  "cloudStorage": [{
    "service": "ibm",
    "bucket": "nodejs-001",
    "credential": { /* Authentication */ },
    "admin": {
      /* Same as AWS */
      "configBucket": { /* Except "policy{putBucketPolicy}" | "tags" | "retentionPolicy" */
        /* */
      },
      "upload": { /* Same as AWS */ },
      "download": { /* Same as AWS */ }
    }
  ]
}
```

4.6.2 Database

- <https://cloud.ibm.com/docs/Cloudant?topic=Cloudant-databases>

Interface

```
import type { PostAll, PostFind, PostSearch, PostView } from "@pi-r/ibm/types";

import type { UserOptions } from "ibm-cloud-sdk-core";
import type { PostDocumentParams } from "@ibm-cloud/cloudant/cloudant/v1";
import type { Options as BearerTokenOptions } from "ibm-cloud-sdk-core/auth/
  ↪authenticators/bearer-token-authenticator";
import type { Options as ContainerOptions } from "ibm-cloud-sdk-core/auth/authenticators/
  ↪container-authenticator";
import type { Options as IamOptions } from "ibm-cloud-sdk-core/auth/authenticators/iam-
  ↪authenticator";
import type { Options as VpcOptions } from "ibm-cloud-sdk-core/auth/authenticators/vpc-
  ↪instance-authenticator";

interface IBMDatabaseQuery extends CloudDatabase {
  source: "cloud";
  service: "ibm";
  credential: string | IBMDatabaseCredential;
  query?: PostFind | PostSearch | PostView;
  update?: PostDocumentParams;
  params?: PostDocumentParams | PostAll;
  partitionKey?: string;
}
```

(continues on next page)

(continued from previous page)

```
interface IBMDatabaseCredential extends AuthValue, UserOptions, Partial<IamOptions>,
↳ ContainerOptions, VpcOptions, BearerTokenOptions {
    authType?: "basic" | "iam" | "bearertoken" | "container" | "vpc" | "mcsp" | "cp4d" |
↳ "couchdb";
    authUrl?: string;
}
```

Authentication

- Connection

```
{
  "dataSource": {
    "credential": "main", // squared.cloud.json
    /* OR */
    "credential": {
      "url": "https://<username>.cloudantnosqldb.appdomain.cloud" // Required (except
↳ with "authUrl")

      "username": "*****", // basic
      "password": "*****",
      "serviceName": "nodejs", // Default is "CLOUDANT"
      /* OR */
      "apikey": "*****", // iam
      /* OR */
      "bearerToken": "*****", // bearertoken
      /* OR */
      "authType": "couchdb",
      "username": "*****",
      "password": "*****",
      /* OR */
      "authType": "container", // "vpc" | "mcsp" | "cp4d"
      "authUrl": "https://iam.cloud.ibm.com", // Used in place of Authenticator.url
↳ property
      "iamProfileName": "iam-user123" // All properties are identical
    }
  }
}
```

Example usage

- Cloudant Client API
- Query

```
{
  "selector": "h1",
  "type": "text",
  "dataSource": {
    "source": "cloud",
```

(continues on next page)

(continued from previous page)

```

"service": "oci",
"credential": { /* Authentication */},

/* ibm.getDocument */
"name": "demo", // "db" property
"id": "1", // "docId" property

/* OR */
"query": { // ibm.postFind
  "db": "demo", // When using "name" (optional)
  "selector": {
    "id": { "$eq": "1" }
  },
  "partitionKey": "" // ibm.postPartitionFind
},
"query": { // ibm.postView
  "db": "demo",
  "ddoc": "demo-doc",
  "view": "demo-view", //
  "partitionKey": "" // ibm.postPartitionView
},
"query": { // ibm.postSearch
  "db": "demo",
  "ddoc": "demo-doc",
  "index": "demo-index",
  "query": "id:'1' AND title:'Bristol'", // Lucene syntax
  "partitionKey": "" // ibm.postPartitionSearch
},
/* OR */
"query": { // ibm.postViewQueries
  "db": "demo",
  "ddoc": "demo-doc",
  "view": "demo-view",
  "queries": [{ "key": "1" }] // ViewQuery[]
},

/* When "query" undefined */

"params": { // ibm.postAllDocs
  "db": "demo"
},
"params": { // ibm.postPartitionAllDocs
  "db": "demo",
  "partitionKey": "Partition1"
},
"params": { // ibm.postBulkGet
  "db": "demo",
  "docs": [{ "id": "1" }] // BulkGetQueryDocument[]
},
"params": { // ibm.postAllDocsQueries
  "db": "demo",
  "queries": [{ "key": "1" }] // AllDocsQuery[]

```

(continues on next page)

(continued from previous page)

```

    },
    "value": "<b>${title}</b>: ${description}",
    "update": { // ibm.postDocument{PostDocumentParams}
      "document": { /* Record<string, any> */ }
    },
    "id": "1" // Same as item being retrieved
  }
}

```

Added in version 0.7.0:

- **CLOUD_UPLOAD_STREAM** attribute in *ICloudServiceClient* was enabled.
- **CLOUD_UPLOAD_CHUNK** attribute in *ICloudServiceClient* was enabled.
- **configBucket.cors** using *CORSCONfiguration* was implemented.
- **configBucket.lifecycle** using *LifecycleConfiguration* was implemented.

4.7 MinIO

- <https://min.io/download>
- `npm i @pi-r/minio`

4.7.1 Interface

```

import type { ClientOptions } from "minio";

interface MinIOStorage extends CloudStorage {
  service: "minio";
  credential: string | MinIOStorageCredential;
  bucket: string;
}

type MinIOStorageCredential = Partial<ClientOptions>;

```

4.7.2 Authentication

- Credentials

```

{
  "credential": "main", // squared.cloud.json
  /* OR */
  "credential": {
    "accessKey": "*****",
    "secretKey": "*****",
    "endPoint": "127.0.0.1",

```

(continues on next page)

(continued from previous page)

```

    "port": 9000,
    "useSSL": false, // Required with "http"
    "region": "us-west-1" // Default is "us-east-1"
  }
}

```

Listing 10: using process.env

```

MINIO_ACCESS_KEY = "";
MINIO_SECRET_KEY = "";
MINIO_SESSION_TOKEN = "";
MINIO_ENDPOINT = ""; // Default is "localhost"

```

Important: These are not official *MinIO* environment variables and require `process.env.apply = true` in *squared.json*.

4.7.3 Example usage

- Client API
- Policy

```

{
  "selector": "img",
  "cloudStorage": [{
    "service": "minio",
    "bucket": "nodejs-001",
    "credential": { /* Authentication */ },
    "admin": {
      "publicRead": true, // Will create a compatible S3 "public-read" policy
      /* OR */
      "acl": "readonly", // "writeonly" | "readwrite" (creates compatible MinIO policy)

      "configBucket": {
        /* minio.setBucketPolicy */
        "policy": "readonly", // "writeonly" | "readwrite" (Canned ACL)
        "policy": "public-read", // Same as AWS
        "policy": {
          "Version": "2012-10-17",
          "Statement": [{
            "Sid": "PublicRead",
            "Effect": "Allow",
            "Principal": {
              "AWS": ["*"]
            },
            "Action": ["s3:GetObject"],
            "Resource": ["arn:aws:s3:::nodejs-001/*"]
          }],
          "Action": ["s3:GetObject"],
          "Resource": ["arn:aws:s3:::nodejs-001/*"]
        }
      },
      "tags": { // minio.setBucketTagging

```

(continues on next page)

(continued from previous page)

```

        "key_1": "value",
        "key_2": "value"
    },
    "tags": {}, // minio.removeBucketTagging
    /* During call to "upload" */
    "create": {
        "versioningConfig": { // minio.setBucketVersioning
            "Status": "Enabled"
        },
        "replicationConfig": { // minio.setBucketReplication
            "role": "arn:minio:replication::b22d653b-e4fb-4c5d-8140-7694c8e72ed4:dest-
↪bucket",
            "rules": [/* Rule */]
        },
        "encryptionConfig": { // minio.setBucketEncryption
            "Rule": [/* Rule */] // Default is "AES256"
        },
        "tags": { // minio.setBucketTagging
            "key_1": "value",
            "key_2": "value"
        }
    },
    "lifecycle": {
        "Rule": [/* Rule */], // minio.setBucketLifecycle
        "Rule": [] // minio.removeBucketLifecycle
    },
    "retentionPolicy": { // minio.setObjectLockConfig
        "mode": "COMPLIANCE",
        "unit": "Days",
        "validity": 10
    }
},
"upload": {
    "publicRead": true, // S3 request header "x-amz-acl" to "public-read"
    /* OR */
    "acl": "authenticated-read", // "aws-exec-read" | "bucket-owner-full-control" |
↪"bucket-owner-read" | "private" | "public-read" | "public-read-write" (S3 Object_
↪Canned ACL)

    "options": {
        "Content-Type": "image/webp" // All objects except when "metadata" is defined
    },

    /* Primary object only */
    "metadata": {
        "Content-Type": "image/png"
    },
    "tags": { // minio.setObjectTagging
        "key_1": "value",
        "key_2": "value"
    },

```

(continues on next page)

(continued from previous page)

```

    "tags": {}, // minio.removeObjectTagging
    "tags": false
  },
  "download": {
    "deleteObject": { // minio.removeObject
      "versionId": "12345",
      "governanceBypass": true
    }
  }
}
}]
}

```

Note: Some variations of functionality are more thoroughly documented in the [AWS](#) examples.

4.7.4 @pi-r/minio

Added in version 0.7.0:

- **CLOUD_UPLOAD_STREAM** attribute in *ICloudServiceClient* was enabled.
- **configBucket.tags** using *TagList* was implemented.
- **configBucket.lifecycle** using *LifecycleConfig* was implemented.
- **configBucket.create** functionality was implemented.

4.8 MongoDB Atlas

- <https://www.mongodb.com/cloud/atlas/register>
- `npm i @pi-r/atlas`

4.8.1 Interface

```

import type { MongoDBDataSource } from "../db/mongodb";
import type { MongoClientOptions } from "mongodb";

interface AtlasDatabaseQuery extends MongoDBDataSource {
  source: "cloud";
  service: "atlas";
  uri: string;
  credential: string | AtlasDatabaseCredential;
  table: string;
}

interface AtlasDatabaseCredential extends AuthValue, MongoClientOptions { /* Empty */ }

```

4.8.2 Authentication

- Connection

```
{
  "dataSource": {
    "uri": "mongodb+srv://<username>:<password>@cluster0.abcdef.mongodb.net/<database>",
    // Required
    /* OR */
    "credential": "main", // squared.cloud.json
    /* OR */
    "credential": {
      "server": "localhost:27017", // OR: 0.0.0.0
      /* OR */
      "hostname": "cluster0.abcdef.mongodb.net",
      "port": 8080, // Default is "27017"

      "username": "*****",
      "password": "*****",
      /* OR */
      "auth": {
        "username": "*****",
        "password": "*****"
      },
    },

    /* Same as @pi-r/mongodb */
  }
}
```

Tip: Atlas connections are compatible with the `@pi-r/mongodb` plugin.

4.8.3 Example usage

- Query

```
{
  "selector": "img",
  "type": "attribute",
  "dataSource": {
    "source": "cloud",
    "service": "atlas",
    "credential": { /* Authentication */ },
    "table": "demo",

    "name": "nodejs", // Database name (optional)

    "id": "1", // Alias for "_id"
    /* OR */
    "query": {
      "id": {
```

(continues on next page)

(continued from previous page)

```

    "$eq": "1"
  },
  "start_date": {
    "$gt": "new Date('2021-01-01')" // When using web service
  },
  "$in": ["new RegExp('^mongodb, i)"], // Quotes are optional [/^mongodb/i]
  "$where": "function() { return this.name == 'mongodb.com'; }" // async is supported
},

"value": "<b>${title}</b>: ${description}",

/* Update */
"id": "1", // Same as item above
/* OR */
"query": { /* Filter<Document> */},

"updateType": 0, // findOneAndUpdate
"updateType": 1, // limit > 1 ? updateMany : findOneAndUpdate
"updateType": 2, // findOneAndReplace
"updateType": 3, // findOneAndDelete
"update": { /* UpdateFilter<Document> */},

"update": [ /* Document */, /* Document */] // Not related to query (insertMany)
}
}

```

4.9 Oracle Cloud Infrastructure

- `npm i @oci`

4.9.1 Storage

- <https://www.oracle.com/cloud/storage/object-storage>

Note: Uses [S3¹](#) compatibility API (AWS v2) and signature **v4**.

Interface

```

import type { ConfigurationOptions } from "aws-sdk/lib/core";

interface OCISStorage extends CloudStorage {
  service: "oci";
  credential: string | OCISStorageCredential;
  bucket: string;
}

```

(continues on next page)

¹ <https://docs.oracle.com/en-us/iaas/Content/Object/Tasks/s3compatibleapi.htm>

(continued from previous page)

```
interface OCISStorageCredential extends ConfigurationOptions {
  accessKeyId: string;
  secretAccessKey: string;
  region?: string;
  endpoint?: string;
  namespace?: string;
}
```

Authentication

- Credentials

```
{
  "dataSource": {
    "credential": "main", // squared.cloud.json
    /* OR */
    "credential": {
      "accessKeyId": "*****",
      "secretAccessKey": "*****",
      /* OR */
      "namespace": "nodejs", // Unofficial
      "region": "ap-tokyo-1",
      /* OR */
      "endpoint": "https://<namespace>.compat.objectstorage.<region>.oraclecloud.com"
    }
  }
}
```

Example usage

- AWS S3 v2

```
{
  "selector": "html", // Any resource
  "cloudStorage": [{
    "service": "oci",
    "bucket": "nodejs-001",
    "credential": { /* Authentication */ },
    "admin": {
      /* Same as AWS */
      "configBucket": { /* Except "policy" | "website" | "cors" | "lifecycle" |
↪ "retentionPolicy" */ },
    },
    "upload": { /* Same as AWS - Except "tags" */ },
    "download": { /* Same as AWS */ }
  }]
}
```

Attention: OCI does not permit creating new *public* buckets through the *S3*^{Page 89, 1} compatibility layer.

4.9.2 Database

- <https://www.oracle.com/autonomous-database/autonomous-json-database>

Important: *Thick mode* environment variables are shared with *@pi/oracle*.

Interface

```
import type { BindParameters, ConnectionAttributes, ExecuteOptions, InitialiseOptions } from "oracledb";

interface OCIDatabaseQuery extends CloudDatabase {
  source: "cloud";
  service: "oci";
  credential: string | OCIDatabaseCredential;
  table?: string;
  query?: string | Record<string, any>;
  options?: ExecuteOptions;
  params?: BindParameters;
  update?: Record<string, any>;
  streamRow?: boolean;
}

interface OCIDatabaseCredential extends ConnectionAttributes, InitialiseOptions { /* Empty */ }
```

Authentication

- Connection

```
{
  "dataSource": {
    "credential": "main", // squared.cloud.json
    /* OR */
    "credential": {
      "user": "nodejs",
      "password": "*****",
      "walletLocation": "/home/user/oracle/wallet", // Optional
      "walletPassword": "*****",
      "connectString": "tcps://adb.ap-tokyo-1.oraclecloud.com:1522/abcdefghijklmno_
nodejs_high.adb.oraclecloud.com"
    },
    /* OR */
    "credential": {
      "connectString": "nodejs_high",

```

(continues on next page)

(continued from previous page)

```

    "configDir": "/opt/oracle/config", // Location of user tnsnames.ora
    "libDir": "/opt/oracle/instantclient_19_11" // Not recommended
  }
}

```

Warning: Property `libDir` is ignored without `NODE_ORACLEDB_DRIVER_MODE = "thick"`. See [@pi-r/oracle](#).

Example usage

- SODA Client API
- Query
- Filter

Tip: SELECT queries are compatible with the [@pi-r/oracle](#) plugin.

```

{
  "selector": "h1",
  "type": "text",
  "dataSource": {
    "source": "cloud",
    "service": "oci",
    "credential": { /* Authentication */ },

    "table": "demo",
    /* AND */
    "id": "1", // SODA.key
    /* OR */
    "query": { "id": { "$eq": "1" } }, // SODA.filter

    "query": "SELECT * FROM demo WHERE id = :id AND value = :value", // oracledb.execute
    "params": [1, "escaped"],
    "options": { /* ExecuteOptions */ },
    /* OR */
    "query": "SELECT d.* from demo NESTED json_document COLUMNS(id, title, description)␣
↪d WHERE d.id = :id", // SODA.execute ("thick" mode)
    "params": [1],
    "options": { /* ExecuteOptions */ },

    "value": "<b>${title}</b>: ${description}",

    "update": { /* Record<string, any> */ }, // SODA.replaceOne
    "id": "1" // Same as item being retrieved
  }
}

```

Note: Column names might be UPPERCASED when using the **query** syntax.

4.9.3 @pi-r/oci

Added in version 0.7.0:

- **CLOUD_UPLOAD_STREAM** attribute in *ICloudServiceClient* was enabled.
- **CLOUD_UPLOAD_CHUNK** attribute in *ICloudServiceClient* was enabled.
- **configBucket.tags** using *PutBucketTaggingRequest* was implemented.

Removed in version 0.7.0:

- *OCIDatabaseCredential* property **username** is a duplicate of property **user**.

DATABASE

5.1 Interface

```
interface DataSource {
  source: string;

  uri?: string; // Connection string
  limit?: number; // Max rows in result
  query?: unknown; // SELECT statement or equivalent syntax
  encoding?: BufferEncoding;

  ignoreCache?: boolean; // Bypass cache without saving
  ignoreCache?: 0 | 1; // 0 - renew cache expiration | 1 - purge cache with saving
  ignoreCache?: [number, number?, number?]; // <= min + max > + renew/purge

  /* Module: Document */
  index?: number; // Pick one specific row
  removeEmpty?: boolean; // Remove element when rows equals 0
  postQuery?: string | ((result: unknown[], item: DataSource) => unknown[] | void); // 
  ↪ Modify arguments or logging (parseable)
  preRender?: string | ((output: string, item: DataSource) => string | void);
  whenEmpty?: string | ((result: unknown[], item: DataSource) => unknown[] | void);

  /* Internal */
  transactionState?: number;
  transactionFail?: boolean;
}
```

```
interface DbDataSource extends DataSource {
  source: string; // Built-in alias | NPM package name

  name?: string; // Database identifier
  table?: string;

  credential?: string; // Stored settings by name
  credential?: PlainObject; // Client supplied by request

  parallel?: boolean; // Active with batched queries (implicit: true)
  streamRow?: boolean; // Read streaming when available
  streamRow?: string | ((row: unknown) => Error | false | void); // Modify row + 
```

(continues on next page)

(continued from previous page)

```

↪exclude (parseable)

update?: unknown; // Syntax by provider
options?: PlainObject; // Used to configure get commands

/* Module: Db */
withCommand?: string | [string, string]; // Will assign PlainObject from "User = ↪
↪settings.users[username]" to target
withCommand: string; // Equivalent to [name:table || table || name || document, ↪
↪string]
withCommand: [string, string]; // User.db.commands["0"]["1"] = { query: unknown }

usePool?: boolean; // Globally managed and released
usePool?: string; // UUIDv1-5 shared session key (db.settings.user_key: ↪
↪username@server/database)

/* Module: Document */
willAbort?: boolean; // Abort is called bypassing settings
}

```

5.1.1 Global

```

interface ServerAuth {
  protocol?: string;
  server?: string;
  hostname?: string;
  port?: number;
  database?: string;
  username?: string;
  password?: string;
}

```

Attention: Enabling **usePool** with a *UUID* key will also copy the value into `credential.uuidKey`¹.

5.2 Pool

Each source provider will associate each client setting with their equivalent system setting for their own hosted pool.

Listing 1: squared.db.json

```

interface PoolConfig {
  min?: number; // Minimum connections
  max?: number; // Maximum connections
  idle?: number; // Maximum idle time before closing connection (ms)
  queue_max?: number; // Maximum clients that can be waiting for a connection
}

```

(continues on next page)

¹ Does not override other existing `uuidKey` sessions.

(continued from previous page)

```

queue_idle?: number; // Maximum time a client can be waiting for a connection (ms)
timeout?: number; // Maximum time to establish a connection (ms)
socket_timeout?: number; // Maximum time without data being sent or received (ms)

/* Module: Db */
purge?: number; // Will check pool idle time when global memory is purged
}

```

Note: Not all properties are supported per provider.

5.3 MariaDB

- MariaDB Server
- `npm i @pi-r/mariadb`

5.3.1 Interface

```

import type { PoolConfig, QueryConfig } from "mariadb";
import type { SecureContextOptions } from "tls";

interface MariaDBDataSource extends DbDataSource {
  source: "mariadb";
  credential: string | MariaDBCredential;
  query?: string | QueryConfig;
  params?: unknown;
}

interface MariaDBCredential extends ServerAuth, PoolConfig {
  ssl?: boolean | string | SecureContextOptions & { rejectUnauthorized?: boolean };
}

```

Pool

```

import type { PoolConfig } from "mariadb";

interface PoolConfig {
  min?: number; // minimumIdle
  max?: number; // connectionLimit
  idle?: number; // idleTimeout
  queue_idle?: number; // acquireTimeout
  timeout?: number; // connectTimeout
  socket_timeout?: number; // socketTimeout
}

```

5.3.2 Authentication

- Connection

```
{
  "dataSource": {
    "uri": "<username>:<password>@localhost:3306/<database>",
    /* OR */
    "credential": "main", // squared.db.json
    /* OR */
    "credential": {
      "host": "localhost", // Required
      "port": 3306,
      "user": "*****", // Required
      "password": "*****",
      "database": "example"
    },
    /* OR */
    "credential": {
      "socketPath": "/var/run/mysqld/mysql.sock",
      "user": "*****",
      "password": "*****",
      "database": "example"
    }
  }
}
```

5.3.3 Example usage

- Query

```
{
  "selector": "img",
  "type": "attribute",
  "dataSource": {
    "source": "mariadb",
    "credential": { /* Authentication */ },

    "query": "SELECT * FROM table WHERE id = ? AND value = ?",
    "query": "./path/to/statement.sql", // Extension ".sql" (settings.directory.sql + ↵
    ↵ users/username/?)
    "params": [1, "escaped"],
    /* OR */
    "query": { "namedPlaceholders": true, "sql": "SELECT * FROM table WHERE id = :id AND ↵
    ↵ value = :value" },
    "params": { "id": 1, "value": "escaped" },

    /* Result: { "item_src": "mariadb.png", "item_alt": "MariaDB" } */
    "value": {
      "src": "item_src",
      "alt": "item_alt"
    }
  },
}
```

(continues on next page)

(continued from previous page)

```

    "usePool": true,
    "options": {
      "minimumIdle": 0,
      "connectionLimit": 10
    }
  }
}

```

5.3.4 @pi-r/mariadb

Added in version 0.6.2:

- *PoolConfig* property **queue_idle** was implemented.

5.4 MongoDB

- MongoDB Community Server
- `npm i @pi-r/mongodb`

Tip: *Atlas* installations can also use the `mongodb` source format.

5.4.1 Interface

```

import type * as "m" from "mongodb";

interface MongoDBDataSource extends DbDataSource {
  source: "mongodb";
  table: string;

  uri: string; // Connection string
  /* OR */
  credential: string | MongoDBCredential;

  id?: string; // Uses ObjectId
  query?: m.Filter<m.Document> | MongoDBFilterValue;
  query?: { value: m.Filter<m.Document>, options: m.CommandOperationOptions }; //
  ↪ "value" is required when using "options"
  aggregate?: m.Document[] | { pipeline: m.Document[], options: m.AggregateOptions };

  command?: m.Document | m.Document[]; // Calls m.runCommand before any queries

  update?: m.UpdateFilter<m.Document> | m.OptionalUnlessRequiredId<unknown>[];
  updateType?: 0 | 1 | 2 | 3; // 0 - update | 1 - insert | 2 - replace | 3 - delete

  options?: m.MongoClientOptions | m.UpdateFilter<m.Document> | m.

```

(continues on next page)

(continued from previous page)

```

↪OptionalUnlessRequiredId<unknown>[];
  client?: {
    db?: m.DbOptions; // Used as options with "name"
    collection?: m.CollectionOptions; // Used as options with "table"
    command?: m.RunCommandOptions; // Used as options with "command"
  };
  execute?: {
    insert?: m.BulkWriteOptions; // Used as options with "update - insert"
    update?: m.UpdateOptions; // Used as options with "update"
  };

  sort?: string | m.Sort | { value: m.Sort, direction: m.SortDirection };
}

interface MongoDBCredential extends ServerAuth, m.MongoClientOptions { /* Empty */}

```

Pool

```

import type { MongoClientOptions } from "mongodb";

interface PoolConfig {
  min?: number; // minPoolSize
  max?: number; // maxPoolSize
  idle?: number; // maxIdleTimeMS
  queue_max?: number; // maxConnecting
  queue_idle?: number; // waitQueueTimeoutMS
  timeout?: number; // connectTimeoutMS
  socket_timeout?: number; // socketTimeoutMS
}

```

5.4.2 Authentication

- Connection

```

{
  "dataSource": {
    "uri": "mongodb://<username>@<password>:localhost:27017",
    /* OR */
    "credential": "main", // squared.db.json
    /* OR */
    "credential": {
      "server": "localhost:27017", // OR: 0.0.0.0
      /* OR */
      "hostname": "cluster0.abcdef.mongodb.net", // Required
      "port": 8080, // Default is "27017"

      "username": "*****",
      "password": "*****",
      /* OR */

```

(continues on next page)

(continued from previous page)

```

    "auth": {
      "username": "*****",
      "password": "*****"
    },

    /* Optional */
    "protocol": "mongodb+srv:", // "mongodb:" (default)

    "authMechanism": "MONGODB-AWS",
    "authMechanismProperties": { "AWS_SESSION_TOKEN": "*****" },
    "authSource": "$external",

    "tlsCertificateKeyFile": "/path/to/tls/x509/key.pem",
    "tlsCertificateKeyFilePassword": "",
    "tlsCAFile": "",
    "tlsCRLFile": "",
    "tlsAllowInvalidHostnames": false,
    "tlsAllowInvalidCertificates": false,
    "tlsInsecure": false
  }
}

```

5.4.3 Example usage

- Query

```

{
  "selector": "img",
  "type": "attribute",
  "dataSource": {
    "source": "mongodb",
    "credential": { /* Authentication */ },
    "table": "demo",

    "name": "nodejs", // Database name (optional)

    "id": "1", // Alias for "_id"
    /* OR */
    "query": {
      "id": {
        "$eq": "1"
      },
      "name": {
        "$regex": "mongodb.*\\.com", // $regex: /mongodb.*\\.com/si
        "$options": "si"
      },
      "start_date": {
        "$gt": "new Date('2021-01-01')" // new Date("2021-01-01")
      },
      "$in": ["new RegExp('^mongodb, i)"], // Quotes are optional [/^mongodb/i]
    }
  }
}

```

(continues on next page)

(continued from previous page)

```

    "$where": "function() { return this.name == 'mongodb.com'; }" // "async" is
↳ supported
  },

  /* Result: { "item_src": "mongo.png", "item_alt": "MongoDB" } */
  "value": {
    "src": "item_src",
    "alt": "item_alt"
  },

  "usePool": true,
  "options": {
    "minPoolSize": 0,
    "maxPoolSize": 10
  },

  /* Update */
  "id": "1", // Same as item retrieved
  /* OR */
  "query": { /* Filter<Document> */},

  "updateType": 0, // db.findOneAndUpdate
  "updateType": 1, // limit > 1 ? db.updateMany : db.findOneAndUpdate
  "updateType": 2, // db.findOneAndReplace
  "updateType": 3, // db.findOneAndDelete
  "update": { /* UpdateFilter<Document> */},

  "update": [ /* Document */, /* Document */] // Not related to query (db.insertMany)
}
}

```

5.5 MySQL

- MySQL Community Server
- `npm i @pi-r/mysql`

5.5.1 Interface

```

import type { PoolOptions, QueryOptions } from "mysql2/promise";
import type { SecureContextOptions } from "tls";

interface MySQLDataSource extends DbDataSource {
  source: "mysql";
  credential: string | MySQLCredential;
  query?: string | QueryOptions;
  params?: unknown;
}

```

(continues on next page)

(continued from previous page)

```
interface MySQLCredential extends ServerAuth, PoolOptions {
  ssl?: boolean | string | SecureContextOptions & { rejectUnauthorized?: boolean };
}
```

Pool

```
import type { PoolOptions } from "mysql2/promise";

interface PoolConfig {
  max?: number; // connectionLimit
  idle?: number; // idleTimeout
  queue_max?: number; // queueLimit
  timeout?: number; // connectTimeout
}
```

5.5.2 Authentication

- Connection

```
{
  "dataSource": {
    "uri": "mysql://<username>:<password>@localhost:3306/<database>",
    /* OR */
    "credential": "main", // squared.db.json
    /* OR */
    "credential": {
      "host": "localhost", // Required
      "port": 3306,
      "user": "*****", // Required
      "password": "*****",
      "database": "example"
    },
    /* OR */
    "credential": {
      "socketPath": "/tmp/mysql.sock",
      "user": "*****",
      "password": "*****",
      "database": "example"
    }
  }
}
```

5.5.3 Example usage

- Query

```
{
  "selector": "img",
  "type": "attribute",
  "dataSource": {
    "source": "mysql",
    "credential": { /* Authentication */},

    "query": "SELECT * FROM table WHERE id = ? AND value = ?",
    "query": "./path/to/statement.sql", // Extension ".sql" (settings.directory.sql + ↵
↵users/username/?)
    "params": [1, "escaped"],
    /* OR */
    "query": "SELECT * FROM table WHERE id = :id AND value = :value",
    "params": { "id": 1, "value": "escaped" },

    /* Result: { "item_src": "mysql.png", "item_alt": "MySQL" } */
    "value": {
      "src": "item_src",
      "alt": "item_alt"
    },

    "usePool": true,
    "options": {
      "connectionLimit": 10,
      "waitForConnections": true
    }
  }
}
```

5.6 Oracle

- Oracle Database Express Edition
- `npm i @pi-r/oracle`

5.6.1 Interface

```
import type { BindParameters, ConnectionAttributes, ExecuteOptions, InitialiseOptions, ↵
↵PoolAttributes } from "oracledb";

interface OracleDataSource extends DbDataSource {
  source: "oracle";
  credential: string | OracleCredential;
  query?: string;
  params?: BindParameters;
  options?: ExecuteOptions;
}
```

(continues on next page)

(continued from previous page)

```
interface OracleCredential extends ServerAuth, ConnectionAttributes, PoolAttributes,
↳ InitialiseOptions { /* Empty */ }
```

Pool

```
import type { PoolAttributes } from "oracledb";

interface PoolConfig {
  min?: number; // poolMin
  max?: number; // poolMax
  idle?: number; // poolTimeout (ms)
  queue_max?: number; // queueMax
  queue_idle?: number; // queueTimeout
  timeout?: number; // connectTimeout (ms)
}
```

5.6.2 Authentication

- Connection
- Service names

```
{
  "dataSource": {
    "uri": "<username>:<password>@localhost:1521/database", // Alias for "connectString"
↳ | "poolAlias"
    /* OR */
    "credential": "main", // squared.db.json
    /* OR */
    "credential": {
      "connectString": "localhost:1521/database",
      "user": "*****",
      "password": "*****",
      "walletLocation": "/home/username/oracle/wallet", // Optional
      "walletPassword": "*****"
    },
    /* OR */
    "credential": {
      "connectString": "nodejs_high",
      "configDir": "/opt/oracle/config", // Location of user tnsnames.ora
      "libDir": "/opt/oracle/instantclient_19_11" // Not recommended
    },
    /* OR */
    "credential": {
      "connectString": "localhost:1521/database",
      "externalAuth": true
    }
  }
}
```

5.6.3 Example usage

- Query

```
{
  "selector": "img",
  "type": "attribute",
  "dataSource": {
    "source": "oracle",
    "credential": { /* Authentication */ },

    "query": "SELECT * FROM table WHERE id = :id AND value = :value",
    "query": "./path/to/statement.sql", // Extension ".sql" (settings.directory.sql + ↵
↵ users/username/?)

    "params": [1, "escaped"],

    /* Result: { "ITEM_SRC": "oracle.png", "ITEM_ALT": "Oracle" } */
    "value": {
      "src": "ITEM_SRC",
      "alt": "ITEM_ALT"
    },

    "usePool": true,
    "options": {
      "poolMin": 0,
      "poolMax": 10
    }
  }
}
```

5.6.4 Thick Mode

- Initialization

Listing 2: using process.env

```
NODE_ORACLEDB_DRIVER_MODE = "thick";
NODE_ORACLEDB_CLIENT_LIB_DIR = "/opt/oracle/product/21c/dbhomeXE"; // libDir (overrides ↵
↵ ORACLE_HOME)
NODE_ORACLEDB_CLIENT_CONFIG_DIR = ""; // configDir
NODE_ORACLEDB_CLIENT_DRIVER_NAME = ""; // driverName
NODE_ORACLEDB_CLIENT_ERROR_URL = ""; // errorUrl
```

Important: These are not official Oracle environment variables and are used to initialize the client only when the module is first loaded.

```
interface InitialiseOptions {
  /**
   * This specifies the directory in which the Optional Oracle Net Configuration and ↵
   ↵ Optional Oracle Client Configuration files reside. It is equivalent to setting the ↵
```

(continues on next page)

(continued from previous page)

```

↳Oracle environment variable TNS_ADMIN to this value. Any value in that environment
↳variable prior to the call to oracledb.initOracleClient() is ignored. If this
↳attribute is not set, Oracle's default configuration file search heuristics are used.
    */
    configDir?: string | undefined;
    /**
     * This specifies the driver name value shown in database views, such as V$SESSION_
    ↳CONNECT_INFO. It can be used by applications to identify themselves for tracing and
    ↳monitoring purposes. The convention is to separate the product name from the product
    ↳version by a colon and single space characters. If this attribute is not specified,
    ↳the value "node-oracledb : version" is used.
     *
     * @see https://oracle.github.io/node-oracledb/doc/api.html#otherinit
     */
    driverName?: string | undefined;
    /**
     * This specifies the URL that is included in the node-oracledb exception message if
    ↳the Oracle Client libraries cannot be loaded. This allows applications that use node-
    ↳oracledb to refer users to application-specific installation instructions. If this
    ↳attribute is not specified, then the node-oracledb installation instructions URL is
    ↳used.
     *
     * @see https://oracle.github.io/node-oracledb/doc/api.html#otherinit
     */
    errorUrl?: string | undefined;
    /**
     * This specifies the directory containing the Oracle Client libraries. If libDir is
    ↳not specified, the default library search mechanism is used. If your client libraries
    ↳are in a full Oracle Client or Oracle Database installation, such as Oracle Database
    ↳"XE" Express Edition, then you must have previously set environment variables like
    ↳ORACLE_HOME before calling initOracleClient().
     *
     * @see https://oracle.github.io/node-oracledb/doc/api.html#oracleclientloading
     */
    libDir?: string | undefined;
}

```

5.7 PostgreSQL

- PostgreSQL Server
- `npm i @pi-r/postgres`

5.7.1 Interface

```
import type { QueryArrayConfig, PoolConfig } from "pg";

interface PostgresDataSource extends DbDataSource {
  source: "postgres";
  credential: string | PostgresCredential;
  query?: string | QueryArrayConfig;
  params?: unknown[];
}

interface PostgresCredential extends ServerAuth, PoolConfig {
  password?: string | (() => string | Promise<string>);
}
```

Pool

```
import type { PoolConfig } from "pg";

interface PoolConfig {
  min?: number; // min
  max?: number; // max
  idle?: number; // idleTimeoutMillis
  timeout?: number; // connectionTimeoutMillis
}
```

5.7.2 Authentication

- Connection

```
{
  "dataSource": {
    "uri": "postgresql://<username>:<password>@localhost:5432/<database>", // Alias for
    ↪ "connectionString"
    /* OR */
    "credential": "main", // squared.db.json
    /* OR */
    "credential": {
      "host": "localhost", // Required
      "port": 5432,
      "user": "*****", // Required
      "password": "*****",
      "database": "example"
    }
  }
}
```


5.7.3 Example usage

- Query

```
{
  "selector": "img",
  "type": "attribute",
  "dataSource": {
    "source": "postgres",
    "credential": { /* Authentication */ },

    "query": "SELECT * FROM table WHERE id = $1 AND value = $2",
    "query": "./path/to/statement.sql", // Extension ".sql" (settings.directory.sql + ↵
↵ users/username/?)

    "params": [1, "escaped"],

    /* Result: { "item_src": "postgres.png", "item_alt": "PostgreSQL" } */
    "value": {
      "src": "item_src",
      "alt": "item_alt"
    },

    "usePool": true,
    "options": {
      "min": 0,
      "max": 10
    }
  }
}
```

5.8 Redis

- Redis Stable
- `npm i @pi-r/redis`

5.8.1 Interface

```
import type { CommandOptions } from "@redis/client/dist/lib/command-options";
import type { ClientCommandOptions } from "@redis/client/dist/lib/client";
import type { RedisClientOptions } from "@redis/client";
import type { CreateOptions } from "@redis/search/dist/commands/CREATE"; // Internal
import type { AggregateOptions, RedisSearchSchema, SearchOptions } from "redis";

interface RedisDataSource extends DbDataSource {
  source: "redis";

  uri: string; // redis://<username>:<password>@hostname:6379
  username?: string; // redis://hostname:6379
  password?: string;
```

(continues on next page)

(continued from previous page)

```

credential?: string | ServerAuth;
database?: number;

format?: "HASH" | "JSON" | "HKEYS" | "HVALS"; // Default is "HASH"
key?: string | Buffer | (string | Buffer)[];
field?: string | Buffer;
path?: string; // JSONPath

search?: {
  index: string; // Preexisting schema
  schema?: RedisSearchSchema; // Temporary schema
  schema?: string; // settings.directory.schema + users/username/?
  query: string;
  options?: CreateOptions;
};
aggregate?: { /* Same */ };

options?: {
  client?: RedisClientOptions;
  command?: RedisCommandOptions;
  get?: PlainObject;
  search?: SearchOptions;
  aggregate?: AggregateOptions;
};

update?: RedisSetValue | RedisSetValue[] | RedisJSONValue | RedisJSONValue[]; // @pi-
↪ r/redis/types
update?: {
  format: "JSON";
  key: string;
  value: unknown | unknown[]; // https://docs.redis.com/latest/stack/json/commands

  command?: "DEL" | "FORGET" | "MERGE" | "MSET" | "NUMINCRBY" | "NUMMULTBY" | "SET"
↪ " | "STRAPPEND"; // Default is "SET"

  command?: "ARRAPPEND" | "ARRINDEX" | "ARRINSERT" | "ARRPOP" | "ARRTRIM";
  start?: number;
  stop?: number;
  index?: number;
};
}

type RedisCredential = ServerAuth;

```

Pool

```
import type { RedisClientOptions } from "redis";

interface PoolConfig { // using isolationPoolOptions
  min?: number; // min
  max?: number; // max
  idle?: number; // idleTimeoutMillis
  queue_max?: number; // maxWaitingClients
  queue_idle?: number; // softIdleTimeoutMillis
  timeout?: number; // acquireTimeoutMillis
}
```

5.8.2 Authentication

Listing 3: squared.db.json

```
{
  "redis": {
    "main": {
      "protocol": "", // Default is "redis:"
      "hostname": "", // Default is "localhost"
      "port": "", // Default is "6379"
      "username": "",
      "password": "",
      "database": 0 // SELECT index (number > 0)
    }
  }
}
```

```
{
  "dataSource": {
    "uri": "redis://localhost:6379",
    "username": "*****",
    "password": "*****",
    /* OR */
    "uri": "redis://<username>:<password>@localhost:6379/<database>",
    /* OR */
    "credential": "main",
    /* OR */
    "credential": {
      "protocol": "redis:",
      "server": "localhost:6379",
      "username": "*****",
      "password": "*****",
      "database": 1
    }
  }
}
```

5.8.3 Example usage

- Query
- JSONPath

```
{
  "selector": "img",
  "type": "attribute",
  "dataSource": {
    "source": "redis",
    "credential": { /* Authentication */ },

    "key": "demo:1",
    /* OR */
    "search": {
      "schema": {
        "name": {
          "type": "TEXT", // SchemaFieldTypes.TEXT
          "sortable": true
        },
        "state": "TAG", // SchemaFieldTypes.TAG
        "age": "NUMERIC" // SchemaFieldTypes.NUMERIC
      },
      /* OR */
      "schema": "./path/to/data.json", // yaml + json5 + toml + xml + cjs

      "query": "@state:{CA}",
      "options": {
        "ON": "HASH", // JSON
        "PREFIX": "noderedis:demo"
      }
    },
  },

  /* Result: { "item_src": "redis.png", "item_alt": "Redis" } */
  "value": {
    "src": "item_src",
    "alt": "item_alt"
  },

  "usePool": true,
  "options": {
    "client": {
      "isolationPoolOptions": {
        "min": 0,
        "max": 10
      }
    }
  }
}
```

Note: Search will only return the **value** object with the **id** field appended as `__id__`.

5.9 SQL Server

- SQL Server 2022 Express
- `npm i @pi-r/mssql`

5.9.1 Interface

```
import type { ConnectionConfiguration } from 'tedious';
import type { DataType, ParameterData } from "tedious/lib/data-type";
import type { PoolConfig } from "@e-mc/mssql/types/pool"; // From "@types/tedious-
↳connection-pool"

interface MSSQLDataSource extends DbDataSource {
  source: "mssql";
  credential: string | MSSQLCredential;
  query?: string;
  params?: MSSQLRequestParameters | MSSQLRequestWithOutputParameters;
  storedProc?: boolean;
  usePool?: boolean | string | PoolConfig; // External pool provider configurable
↳options
}

interface MSSQLCredential extends ServerAuth, ConnectionConfiguration { /* Empty */}

interface MSSQLRequestWithOutputParameters {
  input?: MSSQLRequestParameters;
  output?: MSSQLRequestParameters;
}

interface MSSQLRequestParameterValue {
  name?: string;
  value?: unknown;
  type?: DataType;
  options?: ParameterData;
}

type MSSQLRequestParameters = MSSQLRequestParameterValue[] | ObjectMap
↳<MSSQLRequestParameterValue>;
```

Pool

```
import type { PoolConfig } from "@e-mc/mssql/types/pool";

interface PoolConfig {
  min?: number; // min
  max?: number; // max
  idle?: number; // idleTimeout
  queue_idle?: number; // acquireTimeout
}
```

5.9.2 Authentication

- Connection

```
{
  "dataSource": {
    "uri": "<username>:<password>@localhost:1433/<database>", // authentication.
    ↪options@server:options
    /* OR */
    "credential": "main", // squared.db.json
    /* OR */
    "credential": {
      "server": "localhost",
      "options": {
        "port": 1433,
        "database": "example",
        "trustServerCertificate": true, // Local development

        /* Azure */
        "encrypt": true,
        "enableArithAbort": true,
        "connectionIsolationLevel": 2 // ISOLATION_LEVEL.READ_UNCOMMITTED
      },
      "authentication": {
        "type": "default",
        "options": {
          "userName": "*****",
          "password": "*****"
        }
      }
    }
  }
}
```

5.9.3 Example usage

- Query
- Parameters

```
{
  "selector": "img",
  "type": "attribute",
  "dataSource": {
    "source": "mssql",
    "credential": { /* Authentication */ },

    "query": "SELECT * FROM table WHERE id = @name AND value = @value", // db.execSQL
    "query": "./path/to/statement.sql", // Extension ".sql" (settings.directory.sql + ↪
    ↪users/username/?)
    /* OR */
    "query": "uspGetItems", // db.callProcedure
    "storedProc": true,

```

(continues on next page)

(continued from previous page)

```

    "params": { "a": { "value": "1", "type": "VarChar", "options": { "length": 50 } }, "b
↪": 2 /* Implicit: Int */ }, // MSSQLRequestParameters
    "params": [{ "name": "c", "type": "Decimal", "value": 12.345, "options": { "precision
↪": 10, "scale": 2 } }],
    "params": [{ "name": "d", "type": "TVP", "value": { "columns": [/*
↪MSSQLRequestParameters[] */], "rows": [/* unknown[][] */] }},
    "params": {
        "input": {/* MSSQLRequestParameters */}, // Two keys only for object detection
↪(required)
        "output": {/* MSSQLRequestParameters */} // Last row i{/* MSSQLRequestParameters */
↪}n result (data["__returnvalue__"] = true)
    },

    /* Result: { "item_src": "mssql.png", "item_alt": "SQL Server" } */
    "value": {
        "src": "item_src",
        "alt": "item_alt"
    },

    "usePool": true,
    "usePool": { // tedious-connection-pool2
        "min": 0,
        "max": 10
    }
}
}

```


- <https://gulpjs.com/docs/en/getting-started/quick-start>
- `npm i @pi-r/gulp`

Note: *Gulp* is used as the reference implementation for a **Task** module.

6.1 Example configuration

- CLI

Listing 1: squared.json

```
{
  "task": {
    "gulp": {
      "handler": "@pi-r/gulp",
      "settings": {
        "minify": "./gulpfile.js", // Will execute "minify" task
        "users": {
          "username": {
            "minify": "./username/gulpfile.js" // Will override parent "minify"
          }
        },
        "minify-css": {
          "path": "./gulpfile.css.js", // Required
          "tasks": ["lint", "minify"],
          "opts": ["--series", "--continue"] // CLI
        }
      }
    }
  }
}
```

Important: To use *Gulp* in a user directory requires a global installation.¹

¹ `npm i -g gulp && cd /path/users/username && npm link gulp`

```

{
  "selector": "head > script:nth-of-type(1)",
  "type": "js",
  "tasks": [
    { "handler": "gulp", "task": "minify" },
    { "handler": "gulp", "task": "beautify", "preceding": "true" }, // Execute tasks
    ↪ before transformations
    {
      "handler": "gulp",
      "task": {
        "path": "../gulp/transform.js", // User defined uses file permissions
        "tasks": ["minify"],
        "opts": ["--verify"]
      }
    }
  ]
}

```

6.2 Example gulpfile.js

Renaming files with *Gulp* is not recommended. It is better to use the **saveAs** or **filename** properties when the asset is part of the HTML page.

```

const gulp = require("gulp");
const uglify = require("gulp-uglify");

gulp.task("minify", () => {
  return gulp.src("*")
    .pipe(uglify())
    .pipe(gulp.dest("./"));
});

gulp.task("default", gulp.series("minify"));

```

Caution: *src* (*temp*) and *dest* (*original*) always read and write to the current directory.

6.3 data-chrome-tasks

Tasks can be performed immediately after the asset has been downloaded (*preceding*) and during finalization.

Listing 2: JSON

```

<script
  src="/common/util.js"
  data-chrome-tasks='[{ handler: "gulp", task: "minify" }, { handler: "gulp", task: "lint
  ↪ ", preceding: "true" }]'>
</script>

```

Listing 3: handler : task : preceding? ...+

```
<script src="/common/util.js" data-chrome-tasks="gulp:minify+gulp:lint:true"></script>
```


BUILD OPTIONS

General processing options use **E-mc** functionality with `squared-express`.

Attention: These examples are only relevant to the *chrome* framework.

7.1 Example usage

```
squared.saveAs("index.zip", {
  productionRelease: true, // Ignore local URL rewriting and use actual path
  productionRelease: "/path/to/wwwroot/", // Move assets outside base directory to
  ↪ server root directory
  productionIncremental: true, // Use cached data when processing transformed files

  preserveCrossOrigin: true, // Ignore locally integrating assets hosted on other domains
  preserveCrossOrigin: { // URLData
    hostname: "docs.github.com",
    pathname: "/repositories"
  },

  useOriginalHtmlPage: false, // Use browser validated in memory static page DOM for
  ↪ build
  useOriginalHtmlPage: "textarea|code", // Ignore tags causing parsing errors

  useUnsafeReplace: "html", // Use when there are no element tags inside comments and
  ↪ <script>
  useUnsafeReplace: "css", // Use when there are no comments or block delimiters inside
  ↪ property values (e.g. "{" "}")
  useUnsafeReplace: true, // Alias for ["html", "css"]

  stripCommentsAndCDATA: true, // Remove unused code and non-void tags from HTML
  stripCommentsAndCDATA: "script|picture", // Additional tags to remove using RegExp
  ↪ group notation

  /* Use when there are parsing errors */
  normalizeHtmlOutput: true, // Escape illegal tags and remove unnecessary trailing
  ↪ spaces
  normalizeHtmlOutput: "?%", // Tags to ignore using RegExp negated characters when
  ↪ escaping (e.g. <?php ?> | <%= ej %>)
```

(continues on next page)

(continued from previous page)

```

escapeReservedCharacters: true, // Escape reserved characters inside attributes (e.g. "
↳<"
ignoreServerCodeBlocks: ["<%", "%>", "<?php", ";", "<?php", "?>"], // May produce
↳better results with dynamic content (<% %> | <?php ; | <?php ?>)

removeInlineStyles: false, // Strip style="" attribute from all elements
↳(useOriginalHtmlPage=false)
removeUnusedClasses: false, // Selectors without :pseudo-class
removeUnusedPseudoClasses: false, // Selectors with :pseudo-class (lowercase only)
removeUnusedVariables: false, // --custom-variables
removeUnusedFontFace: false, // @font-face
removeUnusedKeyframes: false, // @keyframes
removeUnusedMedia: false, // @media
removeUnusedSupports: false, // @supports
removeUnusedContainer: false, // @container
removeUnusedScope: false, // @scope

/* Styles which are still being used */
retainUsedStyles: {
  "selectors": [], // Same without separators
  "variables": [],
  "pseudoClass": false, // Will keep "li a:hover" + "li a:visited" when "li a" is a
↳used selector
  "@font-face": [],
  "@keyframes": [],
  "@media": [],
  "@supports": [],
  "@container": [],
  "@scope": []
},
/* OR */
retainUsedStyles: [
  /* CSS selectors (string | RegExp) */,
  /* CSS variables (string prefixed with '--') */,
  /* CSS @font-face (string enclosed within '|font-face:Times New Roman|') */,
  /* CSS @keyframes (string enclosed within '|keyframes:animationName|') */,
  /* CSS @media (string enclosed within '|media:only screen and (min-width: 800px)|') */
↳,
  /* CSS @supports (string enclosed within '|supports:(display: grid)|') */,
  /* CSS @container (string enclosed within '|container:(min-width: 800px)|') */,
  /* CSS @scope (string enclosed within '|scope:selector-start|') */
],

imports: {
  "http://localhost:3000/build/": "./build", // Starts with "http"
  "http://localhost:3000/dist/chrome.framework.js": "/path/project/build/framework/
↳chrome/src/main.js" // Full file path
}
});

```

Caution: Import maps¹ are supported from a file system perspective.

7.2 Example “saveAs”

The entire page can be transformed as a group with the same functionality as JSON (*yaml*) configuration except where highlighted.

```
squared.copyTo("/path/to/target", {
  saveAs: {
    html: { filename: "index.html", process: ["beautify"], attributes: { lang: "en" } },
    script: {
      pathname: "../js",
      filename: "bundle.js", // Only for first bundle
      process: ["es5", "es5-minify"],
      ignoring: ["text/template"], // MIME types
      inlineAction: false // script + link + image
    },
    link: {
      pathname: "css",
      filename: "bundle.css",
      inline: true,
      preserve: true,
      attributes: { rel: "stylesheet", media: "all" },
      inlineAction: true, // merge + override
      inlineAction: "merge", // { "media": "screen" } -> { "rel": "stylesheet", "media":
      ↪ "screen" }
      inlineAction: "override" // { "rel": "alternate" } -> { "rel": "alternate" }
    },
    image: {
      attributes: { loading: "lazy", width: "detect", height: "detect" },
      commands: ["webp(480x300)"], // Only valid for binary images
      process: ["minify-svg"] // Only valid for text based images (e.g. SVG)
    },
    font: {
      pathname: "fonts",
      compress: "woff2", // truetype | opentype | woff | woff2
      blob: false, // Save base64 as file
      blob: "fonts/blob", // Overrides pathname for blob only
      inline: false, // Write file as data:font/ttf;base64
      customize: (uri, mimeType, command) => { // script | link | image | font
        if (mimeType === "font/ttf") {
          command.blob = true; // Does not alter font object
          return "filename.ttf";
        }
        return ""; // Do not alter filename
        /* OR */
        return null; // Ignore file
      }
    }
  }
}
```

(continues on next page)

¹ <https://developer.mozilla.org/docs/Web/HTML/Element/script/type/importmap>

(continued from previous page)

```
}  
});
```

Note: `inlineAction` applies to the entire `data-chrome-*` namespace except **data-chrome-file** and **data-chrome-template**.

7.3 Example cloud storage

```
squared.saveAs("index.zip", {  
  config: "http://localhost:3000/chrome/bundle.yml",  
  saveAs: {  
    html: {  
      cloudStorage: [{ // Create static website  
        service: "aws-v3",  
        bucket: "nodejs-001",  
        credential: {  
          credentials: {  
            accessKeyId: "*****", // Only access key logins are supported with v3  
            secretAccessKey: "*****",  
            sessionToken: ""  
          },  
          region: "us-west-2"  
        },  
        upload: {  
          active: true,  
          endpoint: "https://nodejs-001.s3.us-west-2.amazonaws.com", // Optional  
          overwrite: true  
        }  
      }  
    }  
  },  
  image: { // Non-element images using url() method  
    cloudStorage: [{  
      service: "aws",  
      bucket: "nodejs-001",  
      settings: "main",  
      upload: {  
        active: true  
      }  
    }  
  }  
}  
});
```

Tip: Use “**endpoint**” when your uploaded files are not used by other buckets or web pages.

7.4 Example remote configuration

```
squared.saveAs("bundle.zip", { config: { uri: "http://hostname/chrome/bundle.txt",
↳ mimeType: "text/yaml" } }); // "mimeType" is optional
/* OR */
squared.saveAs("bundle.zip", { config: "http://hostname/chrome/bundle.yml" }); // Detect_
↳ by file extension (default is "json")
```

Listing 1: `http://hostname/pathname/example.html` -to-
`http://hostname/pathname/example.html.json`

```
squared.saveAs("example.zip", { config: { mimeType: "json" } });
/* OR */
squared.saveAs("example.zip", { config: "json" }); // json | yaml
```

Tip: JSON² and TOML³ file formats are also supported.

7.5 Example incremental

Build time during development can be optimized at the global and asset level.

```
squared.saveAs("example.zip", {
  incremental: false, // Cache is not used (explicit)
  incremental: "none", // Will rebuild all assets and use available cache
  incremental: "staging", // Same as "none" but does not use cache (archive)
  incremental: "etag", // Will use current file found only if the ETag is still the same
  incremental: "exists", // Will always use current file if found at destination

  incrementalMap: {
    pathname: {
      "images/": "exists", // Not recursive
      "js/**": "etag" // Glob is supported
    },
    extension: {
      js: "etag",
      mjs: false
    },
    mime: {
      "image/png": "exists", // First match will quit search
      "image/*": "etag"
    },
    overwrite: false // Only when undefined
  }
});
```

² npm i json5

³ npm i toml

7.6 Using sqd.config

The base folder level configuration file is a hash map of URL globs which can match multiple items. Given these two configurations:

Listing 2: *http://hostname/path/sqd.config*

```
http://hostname/path/example1.html
http://hostname/path/example2.html
```

Listing 3: *http://hostname/path/sub/sqd.config*

```
http://hostname/path/sub/example3.html
http://hostname/path/sub/example4.html
```

The hash key `**/example*\\.html` will only match either 1 and 2 or 3 and 4.

Listing 4: *sqd.config*

```
{
  "111-111-111": [{ "selector": "html", "type": "html" }], // Key

  "/project/example.html*": { // Glob
    "ordinal": 1,
    "useOriginalHtmlPage": true
    "elements": [{
      "selector": "html",
      "type": "html",
      "attributes": { "lang": "en" }
    }]
  },
  "/project/example.html?id=1": {
    "ordinal": 2,
    "elements": [{
      "selector": "html",
      "type": "html",
      "hash": "sha256",
      "attributes": { "lang": "ja", "class": "main" },
      "mergeType": "none", // lang=en
      "mergeType": "under", // hash=sha256,lang=en
      "mergeType": "preserve", // hash=sha256,lang=en,class=main
      "mergeType": "over" // hash=sha256,lang=ja,class=main
    }]
  },
  "example.html?id=1": [{ "selector": "html", "type": "html" }], // "elements"
  "example.html": [{ "selector": "html", "type": "html" }], // Does not match "?id=1"

  "**/*\\.html*": [{ "selector": "html", "type": "html" }], // Glob
  "**/*\\.html\\?id=1": [{ "selector": "html", "type": "html" }], // Ignored without
  ↪ "ordinal" or "inherit"
}
```

Attention: Escaping **RegExp** special characters (e.g. ``-|{ }()[]^$+*?.``) is required except when using key match.

7.6.1 Example usage

The order of precedence when using *inherit* is resolved through the asset command property *mergeType*.

Listing 5: First glob match

```
squared.copyTo("/path/output", { config: true }); // inherit is "false"
```

Listing 6: Globbs are concatenated

```
squared.saveAs("/path/output", {
  config: {
    uri: true,
    inherit: true, // Duplicate selectors are replaced
    inherit: "append" // Resolve duplicates with "mergeType"
  }
});
```

Listing 7: Hash key

```
squared.copyTo("/path/output", {
  config: {
    uri: true,
    key: "111-111-111"
  }
});
```

Tip: The filename `sqd.config` is configurable using `settings.outputConfigName`.

7.7 squared

Added in version 5.2.0:

- *DocumentOutput* property **removeUnusedScope** was created.

MODULES

8.1 @e-mc/cloud

- `npm i @e-mc/cloud`

8.1.1 Interface

Listing 1: View Source

```
import type { IHost, IScopeOrigin } from "./index";
import type { ExternalAsset } from "./asset";
import type { BucketWebsiteOptions, CloudDatabase, CloudFeatures, CloudFunctions,
↳ CloudService, CloudStorage, CloudStorageDownload, CloudStorageUpload } from "./cloud";
import type { ClientDbConstructor, IClientDb } from "./core";
import type { BatchQueryResult, QueryResult } from "./db";
import type { LogMessageOptions } from "./logger";
import type { CloudAuthSettings, CloudModule, CloudServiceOptions, CloudSettings,
↳ DbCoerceSettings } from "./settings";

interface ICloud extends IClientDb<IHost, CloudModule, CloudDatabase,
↳ CloudServiceOptions, DbCoerceSettings & CloudAuthSettings> {
  module: CloudModule;
  readonly uploaded: string[];
  readonly downloaded: string[];
  createBucket(service: string, credential: unknown, bucket: string, acl?: unknown,
↳ options?: unknown): Promise<boolean>;
  createBucket(service: string, credential: unknown, bucket: string, publicRead?:
↳ boolean): Promise<boolean>;
  setBucketPolicy(service: string, credential: unknown, bucket: string, options:
↳ unknown): Promise<boolean>;
  setBucketTagging(service: string, credential: unknown, bucket: string, options:
↳ unknown): Promise<boolean>;
  setBucketWebsite(service: string, credential: unknown, bucket: string, options:
↳ BucketWebsiteOptions): Promise<boolean>;
  deleteObjects(service: string, credential: unknown, bucket: string, recursive?:
↳ boolean): Promise<void>;
  uploadObject(service: string, credential: unknown, bucket: string, upload:
↳ CloudStorageUpload, localUri: string, beforeResolve?: ((value: string) => Promise<void>
↳ | void)): Promise<string>;
```

(continues on next page)

(continued from previous page)

```

    downloadObject(service: string, credential: unknown, bucket: string, download: ↵
↵ CloudStorageDownload, beforeResolve?: ((value: Buffer | string | null) => Promise
↵ <string | undefined> | void)): Promise<Buffer | string>;
    getStorage(action: CloudFunctions, data: CloudStorage[] | undefined): CloudStorage | ↵
↵ undefined;
    hasStorage(action: CloudFunctions, storage: CloudStorage): CloudStorageUpload | ↵
↵ false;
    getDatabaseRows(item: CloudDatabase, ignoreErrors: boolean, sessionKey?: string): ↵
↵ Promise<QueryResult>;
    getDatabaseRows(item: CloudDatabase, sessionKey?: string): Promise<QueryResult>;
    getDatabaseBatchRows(batch: CloudDatabase[], ignoreErrors: boolean, sessionKey?: ↵
↵ string): Promise<BatchQueryResult>;
    getDatabaseBatchRows(batch: CloudDatabase[], sessionKey?: string): Promise
↵ <BatchQueryResult>;
    hasCredential(feature: CloudFeatures, data: CloudService, credential?: unknown): ↵
↵ boolean;
    getCredential(item: CloudService, unused?: boolean): PlainObject;
    getSettings(service: string): Record<string, unknown> | undefined;
    settingsOf(service: string, name: "coerce", component: keyof DbCoerceSettings): ↵
↵ unknown;
    settingsOf(service: string, name: "auth", component: keyof CloudAuthSettings): ↵
↵ unknown;
    getUploadHandler(service: string, credential: unknown): (...args: unknown[]) => void;
    getDownloadHandler(service: string, credential: unknown): (...args: unknown[]) => ↵
↵ void;
    resolveService(service: string, folder?: string): string;
    get settings(): CloudSettings;
}

interface CloudConstructor extends ClientDbConstructor<IHost> {
    LOG_CLOUD_FAIL: LogMessageOptions;
    LOG_CLOUD_COMMAND: LogMessageOptions;
    LOG_CLOUD_WARN: LogMessageOptions;
    LOG_CLOUD_UPLOAD: LogMessageOptions;
    LOG_CLOUD_DOWNLOAD: LogMessageOptions;
    LOG_CLOUD_DELETE: LogMessageOptions;
    LOG_CLOUD_DELAYED: LogMessageOptions;
    finalize(this: IHost, instance: ICloud): Promise<unknown>;
    uploadAsset(state: IScopeOrigin<IFileManager, ICloud>, file: ExternalAsset, options: ↵
↵ UploadAssetOptions): Promise<unknown>[];
    uploadAsset(state: IScopeOrigin<IFileManager, ICloud>, file: ExternalAsset, ↵
↵ ignoreProcess: boolean): Promise<unknown>[];
    uploadAsset(state: IScopeOrigin<IFileManager, ICloud>, file: ExternalAsset, ↵
↵ contentType?: string, ignoreProcess?: boolean): Promise<unknown>[];
    sanitizeAssets(assets: ExternalAsset[]): ExternalAsset[];
    readonly prototype: ICloud;
    new(module?: CloudModule, database?: CloudDatabase[], ...args: unknown[]): ICloud;
}

interface ICloudServiceClient {
    CLOUD_SERVICE_NAME: string;
    CLOUD_UPLOAD_DISK?: boolean;

```

(continues on next page)

(continued from previous page)

```

    CLOUD_UPLOAD_STREAM?: boolean;
    CLOUD_UPLOAD_CHUNK?: boolean;
    CLOUD_DOWNLOAD_CHUNK?: boolean;
    validateStorage?(credential: unknown, data?: CloudService): boolean;
    validateDatabase?(credential: unknown, data?: CloudService): boolean;
    createStorageClient?(this: IModule, credential: unknown, service?: string): unknown;
    createDatabaseClient?(this: IModule, credential: unknown, data?: CloudService):
    ↪ unknown;
    createBucket?(this: IModule, credential: unknown, bucket: string, publicRead?:
    ↪ boolean, service?: string, sdk?: string): Promise<boolean>;
    createBucketV2?(this: IModule, credential: unknown, bucket: string, acl?: unknown,
    ↪ options?: unknown, service?: string, sdk?: string): Promise<boolean>;
    setBucketPolicy?(this: IModule, credential: unknown, bucket: string, options:
    ↪ unknown, service?: string, sdk?: string): Promise<boolean>;
    setBucketTagging?(this: IModule, credential: unknown, bucket: string, options:
    ↪ unknown, service?: string, sdk?: string): Promise<boolean>;
    setBucketWebsite?(this: IModule, credential: unknown, bucket: string, options:
    ↪ BucketWebsiteOptions, service?: string, sdk?: string): Promise<boolean>;
    deleteObjects?(this: IModule, credential: unknown, bucket: string, service?: string,
    ↪ sdk?: string, recursive?: boolean): Promise<void>;
    deleteObjectsV2?(this: IModule, credential: unknown, bucket: string, recursive?:
    ↪ boolean, service?: string, sdk?: string): Promise<void>;
    executeQuery?(this: ICloud, credential: unknown, data: CloudDatabase, sessionKey?:
    ↪ string): Promise<QueryResult>;
    executeBatchQuery?(this: ICloud, credential: unknown, batch: CloudDatabase[],
    ↪ sessionKey?: string): Promise<BatchQueryResult>;
  }

```

Added in version 0.9.0:

- *ICloud* method **setBucketTagging** was created.
- *ICloudServiceClient* global **CLOUD_UPLOAD_DISK** replaced **CLOUD_UPLOAD_FROMDISK**.

Removed in version 0.9.0:

- *ICloudServiceClient* global **CLOUD_UPLOAD_FROMDISK** was renamed.

8.1.2 Settings

Listing 2: View JSON

```

import type { PermittedDirectories } from "../core";
import type { CloudServiceOptions, DbSourceOptions, PurgeComponent } from "../settings";

interface CloudModule {
  // handler: "@e-mc/cloud";
  extensions?: string[];
  atlas?: CloudStoredCredentials;
  aws?: CloudStoredCredentials;
  "aws-v3"?: CloudStoredCredentials;
  azure?: CloudStoredCredentials; // az
  gcp?: CloudStoredCredentials; // gcloud

```

(continues on next page)

(continued from previous page)

```

    ibm?: CloudStoredCredentials;
    oci?: CloudStoredCredentials;
    minio?: CloudStoredCredentials;
    settings?: {
        broadcast_id?: string | string[];
        users?: Record<string, Record<string, unknown>>;
        cache_dir?: string;
        session_expires?: number;
        user_key?: Record<string, DbSourceOptions>;
        imports?: StringMap;
        purge?: PurgeComponent;
        atlas?: CloudServiceOptions;
        aws?: CloudServiceOptions;
        "aws-v3"?: CloudServiceOptions;
        azure?: CloudServiceOptions;
        gcp?: CloudServiceOptions;
        ibm?: CloudServiceOptions;
        oci?: CloudServiceOptions;
        minio?: CloudServiceOptions;
    };
    permission?: PermittedDirectories;
}

type CloudStoredCredentials = Record<string, Record<string, unknown>>;

```

Example usage

Listing 3: Using @pi-r/aws

```

const Cloud = require("@e-mc/cloud");

const instance = new Cloud({
  aws: {
    main: {
      accessKeyId: "*****",
      secretAccessKey: "*****"
    }
  },
  "aws-v3": {
    main: {
      credentials: {
        accessKeyId: "*****",
        secretAccessKey: "*****",
        region: "ap-northeast-1"
      }
    }
  }
});
// instance.host = new Host();
instance.init();

```

(continues on next page)

(continued from previous page)

```

const options = {
  contentType: "application/tar",
  acl: "authenticated-read",
  chunkSize: "8mb",
  overwrite: false, // Default
  tags: { key_1: "value", key_2: "value" }
};
Promise.all([
  // nodejs-001/archive.tar
  instance.uploadObject("aws", "main", "nodejs-001", options, "/tmp/archive.tar"),
  // nodejs-001/2024/01-01.tar
  instance.uploadObject("aws", "main", "nodejs-001", { ...options, publicRead: true, ↵
↵  pathname: "2024", filename: "01-01.tar" }, "/tmp/archive.tar"),
  // nodejs-001/archive_1.tar
  instance.uploadObject("aws", { accessKeyId: "*****", secretAccessKey: "*****" },
↵ "nodejs-001", { overwrite: false }, "/tmp/archive.tar")
]);

const rows = await instance.getDatabaseRows({ service: "aws-v3", credential: "main", ↵
↵ table: "demo", key: { id: 1 } });

```

8.1.3 References

- <https://www.unpkg.com/@e-mc/types/lib/asset.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/cloud.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/core.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/db.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/logger.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/settings.d.ts>

8.2 @e-mc/compress

- `npm i @e-mc/compress`

8.2.1 Interface

Listing 4: View Source

```

import type { CompressLevel } from "./squared";

import type { IModule, ModuleConstructor } from "./index";
import type { BufferResult, CompressFormat, TryFileCompressor } from "./compress";
import type { CompressModule, CompressSettings } from "./settings";

import type { WriteStream } from "fs";

```

(continues on next page)

(continued from previous page)

```

import type { Readable } from "stream";
import type { BrotliCompress, Gzip } from "zlib";

interface ICompress extends IModule {
  module: CompressModule;
  level: Record<string, number>;
  compressors: Record<string, TryFileCompressor>;
  chunkSize?: number;
  init(...args: unknown[]): this;
  register(format: string, callback: TryFileCompressor): void;
  getLevel(value: string, fallback?: number): number | undefined;
  getReadable(file: string | URL | Buffer): Readable;
  createGzip(file: string | Buffer, options?: CompressLevel): Gzip;
  createBrotliCompress(file: string | Buffer, options?: CompressLevel): BrotliCompress;
  createWriteStreamAsGzip(file: string | Buffer, output: string, options?: CompressLevel): WriteStream;
  createWriteStreamAsBrotli(file: string | Buffer, output: string, options?: CompressLevel): WriteStream;
  writeGzip(file: string | Buffer, output: string, options?: CompressLevel): Promise<void>;
  writeBrotli(file: string | Buffer, output: string, options?: CompressLevel): Promise<void>;
  tryFile(file: string | Buffer, options: CompressFormat): Promise<BufferResult>;
  tryFile(file: string | Buffer, output: string, options?: CompressFormat): Promise<BufferResult>;
  tryImage(file: string, options: CompressFormat): Promise<BufferResult>;
  tryImage(file: string | Buffer, output: string, options?: CompressFormat): Promise<BufferResult>;
  get settings(): CompressSettings;
}

interface CompressConstructor extends ModuleConstructor {
  singleton(): ICompress;
  readonly prototype: ICompress;
  new(module?: CompressModule): ICompress;
}

```

Added in version 0.9.0:

- *ICompress* methods **writeGzip** | **writeBrotli** were created.

Removed in version 0.9.0:

- *ICompress* methods **tryFile** | **tryImage** optional argument **callback** as *function*.

8.2.2 Settings

Listing 5: View JSON

```
import type { BrotliOptions, ZlibOptions } from "zlib";
import type { Options as ZopfliOptions } from "node-zopfli";

interface CompressModule {
  gzip?: ZlibOptions;
  brotli?: BrotliOptions;
  zopfli?: ZopfliOptions;
  tinify?: {
    api_key?: string;
    proxy?: string;
  };
  settings?: {
    broadcast_id?: string | string[];
    cache?: boolean;
    cache_expires?: number | string;
    gzip_level?: number;
    brotli_quality?: number;
    zopfli_iterations?: number;
    chunk_size?: number | string;
  };
}
```

Example usage

```
const Compress = require("@e-mc/compress");

const instance = new Compress({
  gzip: {
    memLevel: 1,
    windowBits: 16
  },
  tinify: {
    api_key: "*****"
  },
  settings: {
    gzip_level: 9, // Lowest priority
    brotli_quality: 11,
    chunk_size: "16kb" // All compression types
  }
});
instance.init();

const stream = instance.createWriteStreamAsGzip("/tmp/archive.tar", "/path/output/
→archive.tar.gz", { level: 5, chunkSize: 4 * 1024 }); // Override settings
stream
  .on("finish", () => console.log("finish"))
  .on("error", err => console.error(err));
```

(continues on next page)

(continued from previous page)

```
const options = {
  plugin: "tinify",
  format: "png", // Optional with extension
  timeout: 60 * 1000, // 1m
  options: {
    apiKey: "*****" // Override settings
  }
};
instance.tryImage("/tmp/image.png", "/path/output/compressed.png", options)
  .then(data => {
    console.log(Buffer.byteLength(data));
  })
  .catch(err => console.error(err));
```

8.2.3 References

- <https://www.unpkg.com/@e-mc/types/lib/squared.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/compress.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/settings.d.ts>
- <https://www.npmjs.com/package/@types/node>
- <https://www.npmjs.com/package/@types/node-zopfli>

8.3 @e-mc/core

- `npm i @e-mc/core`

8.3.1 Interface

Listing 6: View Source

```
import type { DataSource, LogStatus } from "./squared";

import type { IHost, IModule, ModuleConstructor } from "./index";
import type { CacheOptions, HostInitConfig, JoinQueueOptions, PermissionReadWrite,
↳ ResumeThreadOptions, StoreResultOptions, ThreadCountStat } from "./core";
import type { QueryResult, TimeoutAction } from "./db";
import type { AddEventListenerOptions } from "./dom";
import type { LogState, StatusType } from "./logger";
import type { Settings } from "./node";
import type { ClientDbSettings, ClientModule, ClientSettings, DbCacheValue,
↳ DbCoerceSettings, DbCoerceValue, DbSourceOptions } from "./settings";

interface IHost extends IModule {
  restartable: boolean;
  readonly modules: Set<IModule>;
  readonly subProcesses: Set<IModule>;
```

(continues on next page)

(continued from previous page)

```

readonly startTime: number;
using(...items: unknown[] | [boolean, ...unknown[]]): this;
contains(item: unknown, condition?: (...args: any[]) => boolean): boolean;
find(name: string): IModule | undefined;
findAll(name: string): IModule[];
willLog(name: string): boolean;
ignoreLog(values: boolean | string | string[]): void;
collectLog(level?: boolean): LogStatus<StatusType>[];
pauseLog(): void;
resumeLog(): void;
hasLog(type: string): boolean;
delayMessage(...args: unknown[]): void;
willAbort(value: string | IModule): boolean;
loadModule(name: string, ...args: any[]): IModule | null;
retain(process: IModule): void;
release(process: IModule, log?: boolean): boolean;
restart(...args: unknown[]): void;
joinQueue(options?: JoinQueueOptions): boolean;
updateProgress(name: string, ...args: unknown[]): void;
resumeThread?(options: ResumeThreadOptions): void;
set host(value);
get host(): null;
get config(): Readonly<HostInitConfig>;
get username(): string;
set done(value);
get done(): boolean;
get queued(): boolean;
get logState(): LogState;
get errorCount(): number;
}

interface HostConstructor extends ModuleConstructor {
  loadSettings(settings: Settings, password?: string): boolean;
  loadSettings(settings: Settings, permission?: PermissionReadWrite, password?:
↳ string): boolean;
  isPermission(value: unknown): value is IPermission;
  createPermission(all?: boolean, freeze?: boolean): IPermission;
  kill(username: string, iv: BinaryLike, all: true): number;
  kill(username: string, iv: BinaryLike, pid: number | number[]): number;
  getThreadCount(full: true): ThreadCountStat;
  getThreadCount(username: string, iv?: BinaryLike): ThreadCountStat;
  getThreadCount(username?: string | boolean, iv?: BinaryLike): number;
  getPermissionFromSettings(): IPermission;
  readonly prototype: IHost;
  new(config?: HostInitConfig): IHost;
}

interface IClient extends IModule<IHost> {
  module: ClientModule;
  init(...args: unknown[]): this;
  getUserSettings(): unknown;
  get settings(): ClientSettings;

```

(continues on next page)

(continued from previous page)

```

    set cacheDir(value: string);
    get cacheDir(): string;
    set extensions(values: unknown[]);
    get extensions(): ((...args: unknown[]) => unknown)[];
}

interface ClientConstructor extends ModuleConstructor {
    readonly prototype: IClient;
    new(module?: ClientModule): IClient;
}

interface IClientDb extends IClient<IHost, ClientModule<ClientDbSettings>> {
    database: DataSource[];
    cacheExpires: number;
    add(item: DataSource, state?: number): void;
    hasCache(source: string, sessionId?: string): boolean;
    hasCoerce(source: string, component: keyof DbCoerceSettings, uuidKey: string |
↳ undefined): boolean;
    hasCoerce(source: string, component: keyof DbCoerceSettings, credential?: unknown):
↳ boolean;
    getQueryResult(source: string, credential: unknown, queryString: string, renewCache:
↳ boolean): QueryResult | undefined;
    getQueryResult(source: string, credential: unknown, queryString: string, sessionId:
↳ string | undefined, renewCache?: boolean): QueryResult | undefined;
    getQueryResult(source: string, credential: unknown, queryString: string, options?:
↳ CacheOptions, renewCache?: boolean): QueryResult | undefined;
    setQueryResult(source: string, credential: unknown, queryString: string, result:
↳ unknown, sessionId: string | undefined): QueryResult;
    setQueryResult(source: string, credential: unknown, queryString: string, result:
↳ unknown, options?: CacheOptions): QueryResult;
    getCacheResult(source: string, credential: unknown, queryString: string, cacheValue:
↳ CacheOptions, ignoreCache?: unknown): QueryResult | undefined;
    applyState(items: DataSource | DataSource[], value: number, as?: boolean): void;
    commit(items?: DataSource[]): Promise<boolean>;
    valueOfKey(credential: unknown, name: keyof DbSourceOptions, component?: keyof
↳ DbCoerceSettings): unknown;
    settingsOf(source: string, name: keyof DbSourceOptions, component?: keyof
↳ DbCoerceSettings): unknown;
    settingsKey(uuidKey: string, name: keyof DbSourceOptions, component?: keyof
↳ DbCoerceSettings): unknown;
    get pending(): DataSource[];
    get committed(): DataSource[];
    get failed(): DataSource[];
}

interface ClientDbConstructor extends ClientConstructor<IHost, ClientModule> {
    STORE_RESULT_PARTITION_SIZE: number;
    STORE_RESULT_PARTITION_MULT: number;
    readonly TRANSACTION_ACTIVE: number;
    readonly TRANSACTION_PARTIAL: number;
    readonly TRANSACTION_COMMIT: number;
    readonly TRANSACTION_TERMINATE: number;
}

```

(continues on next page)

(continued from previous page)

```

    readonly TRANSACTION_ABORT: number;
    readonly TRANSACTION_FAIL: number;
    loadSettings(settings: Pick<Settings, "process" | "memory">, password?: string) :↳
↳boolean;
    setTimeout(value: number | string | TimeoutAction | undefined): number;
    convertTime(value: number | string): number;
    findResult(source: string, credential: unknown, queryString: string, timeout: number,
↳ sessionKey?: string | boolean, renewCache?: boolean): QueryResult | undefined;
    storeResult(source: string, credential: unknown, queryString: string, result:↳
↳QueryResult, options: StoreResultOptions): QueryResult;
    storeResult(source: string, credential: unknown, queryString: string, result:↳
↳QueryResult, cache: DbCacheValue): QueryResult;
    storeResult(source: string, credential: unknown, queryString: string, result:↳
↳QueryResult, cache: DbCacheValue | undefined, options?: StoreResultOptions):↳
↳QueryResult;
    storeResult(source: string, credential: unknown, queryString: string, result:↳
↳QueryResult, sessionKey?: string, sessionExpires?: number): QueryResult;
    purgeResult(prefix?: string): Promise<number>;
    extractUUID(credential: unknown): string;
    setPoolConfig(value: unknown): void;
    getPoolConfig(source: string): unknown;
    keyOfResult(source: string, credential: unknown, uuidOnly?: boolean): string;
    readonly prototype: IClientDb;
    new(module?: ClientModule, database?: DataSource[]): IClientDb;
}

interface IAbortComponent extends AbortController {
    reset(): void;
    get aborted(): boolean;
}

interface AbortComponentConstructor {
    attach(instance: IAbortComponent, signal: AbortSignal, options?:↳
↳AddEventListenerOptions): void;
    detach(instance: IAbortComponent, signal: AbortSignal): void;
    readonly prototype: IAbortComponent;
    new(): IAbortComponent;
}

interface IPermission {
    setDiskRead(pathname?: string | string[], enabled?: boolean): void;
    setDiskWrite(pathname?: string | string[], enabled?: boolean): void;
    setUNCRead(pathname?: string | string[], enabled?: boolean): void;
    setUNCWrite(pathname?: string | string[], enabled?: boolean): void;
    getDiskRead(): string | string[];
    getDiskWrite(): string | string[];
    getUNCRead(): string | string[];
    getUNCWrite(): string | string[];
    hasDiskRead(pathname: string): boolean;
    hasDiskWrite(pathname: string): boolean;
    hasUNCRead(pathname: string): boolean;
    hasUNCWrite(pathname: string): boolean;
}

```

(continues on next page)

(continued from previous page)

```

get diskRead(): boolean;
get diskWrite(): boolean;
get uncRead(): boolean;
get uncWrite(): boolean;
}

```

Added in version 0.10.0:

- *IClientDb* method **getCacheResult** was created.

Added in version 0.9.0:

- *IHost* methods were created:

– pauseLog	– hasLog	– updateProgress
– resumeLog	– delayMessage	
- *IHost* property **logState** was created.

Removed in version 0.9.0:

- *IClientDb* method **hasCache** optional argument **override** as *DbCacheValue*.
- *IClientDb* method **hasCoerce** optional argument **override** as *DbCoerceValue*.

8.3.2 Settings

Listing 7: View JSON

```

import type { ExecOptions } from "../settings";

import type { MinimatchOptions } from "minimatch";
import type { PicomatchOptions } from "picomatch";

interface ProcessModule {
  thread?: {
    admin: {
      users?: string[];
      private?: boolean;
    };
    queue?: {
      limit?: number;
      expires?: number | string;
      priority: {
        bypass?: number;
        min?: number;
        max?: number;
      };
    };
    limit?: number;
    expires?: number | string;
  };
}

```

(continues on next page)

(continued from previous page)

```
interface PermissionModule {
  disk_read?: string | string[];
  disk_write?: string | string[];
  unc_read?: string | string[];
  unc_write?: string | string[];
  settings?: {
    broadcast_id?: string | string[];
    picomatch?: PicomatchOptions | null;
    minimatch?: MinimatchOptions | null;
  };
}
```

Example usage

Listing 8: Abstract class

```
const { Host } = require("@e-mc/core");

Host.loadSettings({ // Global
  process: {
    thread: { limit: 8 }
  },
  permission: {
    disk_read: ["**/*"],
    disk_write: ["/tmp/**"]
  }
});
```

Attention: `@e-mc/core` is mostly a collection of abstract base classes which cannot be instantiated. *Host* is more commonly called through `@e-mc/file-manager`.

8.3.3 References

- <https://www.unpkg.com/@e-mc/types/lib/squared.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/core.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/db.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/dom.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/logger.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/node.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/settings.d.ts>
- <https://www.npmjs.com/package/minimatch>
- <https://www.npmjs.com/package/picomatch>

8.4 @e-mc/db

- `npm i @e-mc/db`

8.4.1 Interface

Listing 9: View Source

```
import type { DbDataSource } from "./squared";

import type { IHost } from "./index";
import type { ClientDbConstructor, IClientDb } from "./core";
import type { DB_TYPE, SQL_COMMAND, BatchQueryResult, ErrorQueryCallback,
↳ ExecuteBatchQueryOptions, ExecuteQueryOptions, HandleFailOptions, ProcessRowsOptions,
↳ QueryResult } from "./db";
import type { AuthValue } from "./http";
import type { DbCoerceSettings, DbModule, DbSourceOptions, PoolConfig } from "./settings
↳ ";

import type { SecureContextOptions } from "tls";

interface IDb extends IClientDb<IHost, DbModule, DbDataSource, DbSourceOptions,
↳ DbCoerceSettings> {
  setCredential(item: DbDataSource): Promise<void>;
  getCredential(item: DbDataSource): PlainObject;
  hasSource(source: string, ...type: number[]): boolean;
  applyCommand(...items: DbDataSource[]): void;
  executeQuery(item: DbDataSource, callback: ErrorQueryCallback): Promise<QueryResult>;
  executeQuery(item: DbDataSource, sessionKey: string): Promise<QueryResult>;
  executeQuery(item: DbDataSource, options?: ExecuteQueryOptions | string): Promise
↳ <QueryResult>;
  executeBatchQuery(batch: DbDataSource[], callback: ErrorQueryCallback, outResult?:
↳ BatchQueryResult): Promise<BatchQueryResult>;
  executeBatchQuery(batch: DbDataSource[], sessionKey: string, outResult?:
↳ BatchQueryResult): Promise<BatchQueryResult>;
  executeBatchQuery(batch: DbDataSource[], options?: ExecuteBatchQueryOptions | string,
↳ outResult?: BatchQueryResult): Promise<BatchQueryResult>;
  processRows(batch: DbDataSource[], tasks: Promise<QueryResult | null>[], parallel:
↳ boolean): Promise<BatchQueryResult>;
  processRows(batch: DbDataSource[], tasks: Promise<QueryResult | null>[], options?:
↳ ProcessRowsOptions, outResult?: BatchQueryResult): Promise<BatchQueryResult>;
  handleFail(err: unknown, item: DbDataSource, options?: HandleFailOptions): boolean;
  readTLSCert(value: unknown, cache?: boolean): string;
  readTLSConfig(options: SecureContextOptions, cache?: boolean): void;
  settingsOf(source: string, name: keyof Omit<DbSourceOptions, "coerce">): unknown;
  settingsOf(source: string, name: "coerce", component: keyof DbCoerceSettings):
↳ unknown;
  settingsKey(source: string, name: keyof Omit<DbSourceOptions, "coerce">): unknown;
  settingsKey(source: string, name: "coerce", component: keyof DbCoerceSettings):
↳ unknown;
  getPoolConfig(source: string, uuidKey?: string): Required<PoolConfig> | undefined;
  get sourceType(): DB_TYPE;
```

(continues on next page)

(continued from previous page)

```

    get commandType(): SQL_COMMAND;
}

interface DbConstructor extends ClientDbConstructor<IHost> {
    setPoolConfig(value: Record<string, PoolConfig>): void;
    getPoolConfig(source: string): Required<PoolConfig> | undefined;
    readonly prototype: IDb;
    new(module?: DbModule, database?: DbDataSource[], ...args: unknown[]): IDb;
}

interface IDbSourceClient {
    DB_SOURCE_NAME: string;
    DB_SOURCE_CLIENT: boolean;
    DB_SOURCE_TYPE: number;
    setCredential(this: IDb, item: DbDataSource): Promise<void>;
    executeQuery(this: IDb, item: DbDataSource, options?: ExecuteQueryOptions | string): Promise<QueryResult>;
    executeBatchQuery(this: IDb, batch: DbDataSource[], options?: ExecuteBatchQueryOptions | string, outResult?: BatchQueryResult): Promise<BatchQueryResult>;
    checkTimeout?(this: IDbSourceClient, value: number, limit?: number): Promise<number>;
}

interface IDbPool {
    client: unknown;
    lastAccessed: number;
    success: number;
    failed: number;
    poolKey: string;
    uuidKey: AuthValue | null;
    add(item: DbDataSource, uuidKey?: string): this;
    has(item: DbDataSource): boolean;
    getConnection(): Promise<unknown>;
    remove(): void;
    detach(force?: boolean): Promise<void>;
    close(): Promise<void>;
    isIdle(timeout: number): boolean;
    isEmpty(): boolean;
    set connected(value: boolean);
    get persist(): boolean;
    get closed(): boolean;
    get closeable(): boolean;
    set parent(value: Record<string, IDbPool>);
}

interface DbPoolConstructor {
    CACHE_UNUSED: readonly string[];
    asString(credential: unknown): string;
    sanitize(credential: unknown): unknown;
    removeUUIDKey(credential: unknown): unknown;
    findKey(pools: Record<string, IDbPool>, uuidKey: unknown, poolKey: string | undefined, ...items: DbDataSource[]): Record<string, IDbPool> | null;
}

```

(continues on next page)

(continued from previous page)

```

    validateKey(pools: Record<string, IDbPool>, username: string, uuidKey: unknown):
    ↪ [string, Record<string, IDbPool> | null];
    checkTimeout(pools: Record<string, IDbPool>, value: number, limit?: number): Promise
    ↪ <number>;
    readonly prototype: IDbPool;
    new(pool: unknown, poolKey: string, uuidKey?: AuthValue | null): IDbPool;
}

```

Added in version 0.10.0:

- *DbPoolConstructor* static property **CACHE_UNUSED** for unused pool attributes was created.
- *DbPoolConstructor* static methods **asString** | **sanitize** | **removeUUIDKey** for pool keys were created.

Added in version 0.9.0:

- *IDb* methods **executeQuery** | **executeBatchQuery** call with parameter *callback* as *ErrorQueryCallback*.

8.4.2 Settings

Listing 10: View JSON

```

import type { DbSourceOptions, PurgeComponent } from "../settings";

interface DbModule {
  // handler: "@e-mc/db";
  mariadb?: DbStoredCredentials;
  mongodb?: DbStoredCredentials;
  mssql?: DbStoredCredentials;
  mysql?: DbStoredCredentials;
  oracle?: DbStoredCredentials;
  postgres?: DbStoredCredentials;
  redis?: DbStoredCredentials;
  settings?: {
    broadcast_id?: string | string[];
    users?: Record<string, Record<string, unknown>>;
    cache_dir?: string;
    session_expires?: number;
    user_key?: Record<string, DbSourceOptions>;
    imports?: StringMap;
    purge?: PurgeComponent;
    mariadb?: DbSourceOptions;
    mongodb?: DbSourceOptions;
    mssql?: DbSourceOptions;
    mysql?: DbSourceOptions;
    oracle?: DbSourceOptions;
    postgres?: DbSourceOptions;
    redis?: DbSourceOptions;
  };
}

type DbStoredCredentials = Record<string, Record<string, unknown>>;

```

Example usage

Listing 11: Using @pi-r/mongodb

```
const Db = require("@e-mc/db");

const instance = new Db({
  mongodb: {
    main: {
      server: "localhost:27017",
      auth: {
        username: "*****",
        password: "*****"
      },
      authMechanism: "SCRAM-SHA-1"
    }
  },
  settings: {
    mongodb: {
      pool: {
        max: 10,
        idle: 60 * 1000,
        queue_max: 4,
        queue_idle: 30 * 1000,
        timeout: 10 * 1000
      },
      cache: {
        timeout: "1d",
        when_empty: false
      },
      coerce: {
        credential: false,
        options: true
      }
    }
  }
});
// instance.host = new Host();
instance.init();

const item = {
  source: "mongodb",
  credential: "main",
  table: "demo",
  name: "nodejs",
  query: {
    id: {
      "$eq": "1"
    }
  },
  willAbort: true
};
await instance.setCredential(item);
```

(continues on next page)

(continued from previous page)

```

const rows = await instance.executeQuery(item, (err, item) => {
  if (err.code === "E11000") {
    return true; // throw err;
  }
  return false; // return [];
});

const [rows1, rows2] = await instance.executeBatchQuery([
  { ...item, usePool: true },
  { ...item, query: { id: { "$eq": "2" } } }
],
{ parallel: true, connectOnce: true }
);

```

8.4.3 References

- <https://www.unpkg.com/@e-mc/types/lib/squared.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/core.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/db.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/http.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/settings.d.ts>
- <https://www.npmjs.com/package/@types/node>

8.5 @e-mc/document

- `npm i @e-mc/document`

8.5.1 Interface

Listing 12: View Source

```

import type { DataSource, ViewEngine } from "./squared";

import type { IFFileManager, IScopeOrigin } from "./index";
import type { ExternalAsset, FileCommand, IFileThread, OutputFinalize } from "./asset";
import type { HostInitConfig, IClient } from "./core";
import type { AsSourceFileOptions, ConfigOrTransformer, CustomizeOptions,
↳GenerateLintTableOptions, LintMessage, PluginConfig, SourceCode, SourceInput,
↳SourceMap, SourceMapOptions, TransformAction, TransformCallback, TransformOutput,
↳TransformResult, UpdateGradleOptions } from "./document";
import type { PostFinalizeCallback } from "./filemanager";
import type { LogComponent } from "./logger";
import type { DocumentComponent, DocumentComponentOption, DocumentModule } from "./
↳settings";

```

(continues on next page)

(continued from previous page)

```

import type { IFileGroup, WatchInitResult } from "../watch";

interface IDocument extends IClient<IFileManager, DocumentModule, TransformCallback
↳<IFileManager, ExternalAsset>> {
  Db: IDb | null;
  assets: ExternalAsset[];
  config: Record<string, any>;
  init(assets: ExternalAsset[], config?: HostInitConfig): this;
  customize(options?: CustomizeOptions): void;
  findConfig(data: object, name: string, type?: string): PluginConfig;
  loadConfig(data: object, name: string): ConfigOrTransformer | null | undefined;
  asSourceFile(value: string, cache: boolean): unknown;
  asSourceFile(value: string, options?: AsSourceFileOptions): unknown;
  findVersion(name: string | string[], fallback?: string): string;
  findSourceScope(uri: string, imports: Record<string, unknown>): StringMap[];
  findSourceRoot(uri: string, imports?: StringMap): string | undefined;
  resolveDir(name: string, ...paths: string[]): string | undefined;
  locateSourceFiles(file: ExternalAsset, code?: string, bundleContent?: string[]):
↳((imports?: StringMap) => SourceInput | undefined);
  resolveSourceFile(file: ExternalAsset): ((code?: string, imports?: StringMap) =>
↳SourceInput<string> | undefined);
  tryParse(source: string, format: string, options?: PlainObject): unknown;
  forDb(item: DataSource): boolean;
  hasEval(name: string): boolean;
  settingsOf(name: keyof DocumentComponent, option: keyof DocumentComponentOption):
↳unknown;
  parseTemplate(viewEngine: ViewEngine | string, template: string, data: unknown[]):
↳Promise<string | null>;
  transform(type: string, code: string, format: string | string[], options?:
↳TransformOutput & TransformAction): Promise<TransformResult | void>;
  abort(err: Error): void;
  abort(name?: keyof DocumentComponent, reason?: unknown): void;
  restart(): void;
  using?(data: IFileThread): Promise<unknown>;
  setLocalUri?(file: ExternalAsset, replace?: boolean): void;
  resolveUri?(file: ExternalAsset, source: string): string;
  resolveUri?(file: ExternalAsset, source: string, trailing: string): [string, string];
  resolveImports?(file: ExternalAsset, code: string, baseFile?: string |
↳ExternalAsset): string | undefined;
  replaceContent?(source: string, statement: RegExpExecArray | string, mimeType?:
↳string): string | undefined;
  addCopy?(data: FileCommand<ExternalAsset>, saveAs: string, replace?: boolean):
↳string | undefined;
  writeImage?(output: OutputFinalize<ExternalAsset>): boolean;
  cloudInit?(state: IScopeOrigin<IFileManager, ICloud>): void;
  cloudObject?(state: IScopeOrigin<IFileManager, ICloud>, file: ExternalAsset):
↳boolean;
  cloudUpload?(state: IScopeOrigin<IFileManager, ICloud>, file: ExternalAsset, url:
↳string, active: boolean): Promise<boolean>;
  cloudFinalize?(state: IScopeOrigin<IFileManager, ICloud>): Promise<unknown[]>;
  watchInit?(watch: IFileGroup<ExternalAsset>, assets: ExternalAsset[], sanitize?:
↳boolean): WatchInitResult | undefined;

```

(continues on next page)

(continued from previous page)

```

    watchModified?(watch: IFileGroup<ExternalAsset>, assets?: ExternalAsset[]): ␣
    ↪PostFinalizeCallback;
    set dataSource(value: DataSource[]);
    get dataSource(): DataSource[];
    set imports(value);
    get imports(): StringMap;
    get watching(): boolean;
}

interface DocumentConstructor extends ModuleConstructor {
    finalize(this: IFileManager, instance: IDocument): Promise<unknown>;
    createSourceMap(code: string, remove: boolean): SourceMap;
    createSourceMap(code: string, uri?: string, remove?: boolean): SourceMap;
    writeSourceMap(uri: string, data: SourceCode, options?: SourceMapOptions): string | ␣
    ↪undefined;
    updateGradle(source: string, namespaces: string[], value: string, upgrade: boolean): ␣
    ↪string;
    updateGradle(source: string, namespaces: string[], value: string, options?: ␣
    ↪UpdateGradleOptions): string;
    generateLintTable(messages: LintMessage[], options: GenerateLintTableOptions): ␣
    ↪LogComponent[];
    cleanup?(this: IFileManager, instance: IDocument): Promise<unknown>;
    sanitizeAssets?(assets: ExternalAsset[], exclusions?: ExternalAsset[]): ␣
    ↪ExternalAsset[];
    readonly prototype: IDocument;
    new(module?: DocumentModule, ...args: unknown[]): IDocument;
}

```

Added in version 0.9.0:

- *IDocument* property **config** was made abstract.

8.5.2 Settings

Listing 13: View JSON

```

import type { PermittedDirectories } from "../core";
import type { DbModule, DbSettings, DocumentComponentOptions, PurgeComponent } from "../
    ↪settings";

interface DocumentModule {
    // handler: "@pi-r/chrome";
    extensions?: string[];
    db?: DbModule<DbSettings>;
    eval?: {
        function?: boolean;
        absolute?: boolean;
        template?: boolean;
        userconfig?: boolean;
    };
    format?: {

```

(continues on next page)

(continued from previous page)

```

    uuid?: {
      dictionary?: string;
      pathname?: string;
      filename?: string;
    };
  };
  imports?: StringMap;
  settings?: {
    broadcast_id?: string | string[];
    users?: Record<string, {
      extensions?: string[] | null;
      imports?: StringMap;
      imports_strict?: boolean;
      pages?: unknown;
      transform?: unknown;
      view_engine?: unknown;
    }>;
    cache_dir?: string;
    imports_strict?: boolean;
    directory?: {
      template?: string;
      data?: string;
      export?: string;
      schema?: string;
      package?: string;
    };
    purge?: PurgeComponent;
    options?: DocumentComponentOptions<boolean | number>;
    pages?: Record<string, Record<string, unknown>>;
    transform?: {
      html?: Record<string, Record<string, unknown>>;
      css?: Record<string, Record<string, unknown>>;
      js?: Record<string, Record<string, unknown>>;
    };
    view_engine?: Record<string, Record<string, unknown>>;
    export?: Record<string, string | (...args: unknown[]) => unknown>;
  };
  permission?: PermittedDirectories;
}

```

Example usage

Listing 14: Abstract class

```

const Document = require("@e-mc/document"); // @pi-r/chrome

const assets = [
  { pathname: "output", filename: "image1.png", uri: "http://hostname/path/document1.png" },
  { pathname: "output", filename: "image2.png", uri: "http://hostname/path/document2.png" }
]

```

(continues on next page)

(continued from previous page)

```
];  
  
const instance = new Document({  
  eval: {  
    function: true,  
    template: true  
  },  
  imports: {  
    "http://hostname/path/": "build/"  
  },  
  settings: {  
    imports_strict: true,  
    users: {  
      "nodejs-001": {  
        imports_strict: false,  
        imports: {  
          "http://hostname/path": "build"  
        }  
      }  
    },  
  },  
  directory: {  
    template: "../chrome/template" // ../chrome/template/users/nodejs-001  
  }  
}  
});  
// instance.host = new Host();  
instance.init/assets);
```

Attention: `@e-mc/document` is an abstract base class and cannot be instantiated. *Document* is more commonly called through `@pi-r/chrome`.

8.5.3 References

- <https://www.unpkg.com/@e-mc/types/lib/squared.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/asset.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/core.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/document.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/filemanager.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/logger.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/settings.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/watch.d.ts>

8.6 @e-mc/file-manager

- `npm i @e-mc/file-manager`

8.6.1 Interface

Listing 15: View Source

```
import type { DataSource, IncrementalMatch, TaskAction } from "./squared";

import type { DocumentConstructor, HostConstructor, ICloud, ICompress, IDocument, IHost,
↳ IImage, IModule, IRequest, ITask, ImageConstructor, TaskConstructor, WatchInstance } from
↳ "./index";
import type { ExternalAsset, FileCommand, FileData, IFileThread, OutputFinalize } from ".
↳ /asset";
import type { IPermission, PermissionReadWrite } from "./core";
import type { AssetContentOptions, ChecksumOptions, DeleteFileAddendum, FileOutput,
↳ FinalizeResult, FindAssetOptions, IHttpDiskCache, IHttpMemoryCache, InstallData,
↳ PostFinalizeCallback, ReplaceOptions } from "./filemanager";
import type { ExecCommand } from "./logger";
import type { CopyFileOptions, CreateDirOptions, DeleteFileOptions, MoveFileOptions,
↳ ReadFileOptions, RemoveDirOptions, WriteFileOptions } from "./module";
import type { RequestData, Settings } from "./node";
import type { Aria2Options, BufferFormat, OpenOptions } from "./request";
import type { CloudModule, CompressModule, DbModule, DocumentModule, HttpConnectSettings,
↳ HttpMemorySettings, ImageModule, RequestModule, TaskModule, WatchModule } from ".
↳ settings";

import type { SpawnOptions } from "child_process";
import type { NoParamCallback } from "fs";

interface IFileManager extends IHost, Set<string> {
  processTimeout: number;
  cacheToDisk: IHttpDiskCache<ExternalAsset>;
  cacheToMemory: IHttpMemoryCache<ExternalAsset>;
  Request: IRequest<RequestModule>;
  Document: InstallData<IDocument<IFileManager, ExternalAsset>, DocumentConstructor
↳ <IFileManager, ExternalAsset>>[];
  Task: InstallData<ITask, TaskConstructor>[];
  Image: Map<string, InstallData<IImage, ImageConstructor>> | null;
  Cloud: ICloud | null;
  Watch: WatchInstance<ExternalAsset> | null;
  Compress: ICompress<CompressModule> | null;
  readonly documentAssets: ExternalAsset[];
  readonly taskAssets: (ExternalAsset & Required<TaskAction>>[];
  readonly dataSourceItems: DataSource[];
  readonly files: Set<string>;
  readonly filesQueued: Set<string>;
  readonly filesToRemove: Set<string>;
  readonly filesToCompare: Map<ExternalAsset, string[]>;
  readonly contentToAppend: Map<string, string[]>;
  readonly contentToReplace: Map<string, string[]>;
```

(continues on next page)

(continued from previous page)

```

    readonly processing: IFileThread[];
    readonly fetchedAssets: ExternalAsset[];
    readonly copiedAssets: ExternalAsset[];
    readonly emptyDir: Set<string>;
    install(name: "document", handler: string, module?: DocumentModule, ...args:↳
↳unknown[]): IDocument | undefined;
    install(name: "document", target: DocumentConstructor, module?: DocumentModule, ...
↳args: unknown[]): IDocument | undefined;
    install(name: "task", handler: string, module?: TaskModule, ...args: unknown[]):↳
↳ITask | undefined;
    install(name: "task", target: TaskConstructor, module?: TaskModule, ...args:↳
↳unknown[]): ITask | undefined;
    install(name: "cloud", handler: string, module?: CloudModule, ...args: unknown[]):↳
↳ICloud | undefined;
    install(name: "cloud", module?: CloudModule, ...args: unknown[]): ICloud | undefined;
    install(name: "image", handler: string, module?: ImageModule, ...args: unknown[]):↳
↳IImage | undefined;
    install(name: "image", target: ImageConstructor, module?: ImageModule, ...args:↳
↳unknown[]): IImage | undefined;
    install(name: "image", targets: Map<string, ImageConstructor>, module?:↳
↳ImageModule): void;
    install(name: "watch", module: WatchModule): WatchInstance<ExternalAsset> |↳
↳undefined;
    install(name: "watch", interval?: number | string, port?: number | string,↳
↳securePort?: number | string, extensions?: unknown[]): WatchInstance<ExternalAsset> |↳
↳undefined;
    install(name: "compress", module?: CompressModule): ICompress<CompressModule> |↳
↳undefined;
    install(name: string, ...args: unknown[]): IModule | undefined;
    using(...items: ExternalAsset[] | [boolean, ...ExternalAsset[]]): this;
    contains(item: ExternalAsset, condition?: (target: ExternalAsset) => boolean):↳
↳boolean;
    removeCwd(value: unknown): string;
    findAsset(value: string | URL, instance: IModule | null): ExternalAsset | undefined;
    findAsset(value: string | URL, options?: FindAssetOptions<ExternalAsset>):↳
↳ExternalAsset | undefined;
    removeAsset(file: ExternalAsset): boolean;
    replace(file: ExternalAsset, replaceWith: string, mimeType: string | undefined):↳
↳boolean;
    replace(file: ExternalAsset, replaceWith: string, options?: ReplaceOptions): boolean;
    rename(file: ExternalAsset, value: string): boolean;
    performAsyncTask(): void;
    removeAsyncTask(): void;
    completeAsyncTask(err?: unknown, uri?: string, parent?: ExternalAsset, type?:↳
↳number): void;
    performFinalize(override?: boolean): void;
    hasDocument(instance: IModule, document: string | string[] | undefined): boolean;
    getDocumentAssets(instance: IModule, condition?: (target: ExternalAsset) =>↳
↳boolean): ExternalAsset[];
    getDataSourceItems(instance: IModule, condition?: (target: DataSource) => boolean):↳
↳DataSource[];
    setLocalUri(file: ExternalAsset, replace?: boolean): FileOutput;

```

(continues on next page)

(continued from previous page)

```

getLocalUri(data: FileData<ExternalAsset>): string;
getMimeType(data: FileData<ExternalAsset>): string;
openThread(instance: IModule, data: IFileThread, timeout?: number): boolean;
closeThread(instance: IModule | null, data: IFileThread, callback?: (...args:↳
↳unknown[]) => void): boolean;
addProcessTimeout(instance: IModule, file: ExternalAsset, timeout: number): void;
removeProcessTimeout(instance: IModule, file: ExternalAsset): void;
getProcessTimeout(handler: InstallData): number;
clearProcessTimeout(): void;
scheduleTask(url: string | URL, data: unknown, priority: number): Promise<unknown>;
scheduleTask(url: string | URL, data: unknown, thenCallback?: (...args: unknown[]) =>
↳ unknown, catchCallback?: (...args: unknown[]) => unknown, priority?: number): Promise
↳<unknown>;
setTaskLimit(value: number): void;
addDownload(value: number | Buffer | string, encoding: BufferEncoding): number;
addDownload(value: number | Buffer | string, type?: number | BufferEncoding,↳
↳encoding?: BufferEncoding): number;
getDownload(type?: number): [number, number];
transformAsset(data: IFileThread, parent?: ExternalAsset, override?: boolean):↳
↳Promise<boolean>;
addCopy(data: FileCommand<ExternalAsset>, saveAs?: string, replace?: boolean):↳
↳string | undefined;
findMime(file: ExternalAsset, rename?: boolean): Promise<string>;
getUTF8String(file: ExternalAsset, uri?: string): string;
getBuffer(file: ExternalAsset, minStreamSize?: number): Promise<Buffer | null> |↳
↳Buffer | null;
getCacheDir(url: string | URL, createDir?: boolean): string;
setAssetContent(file: ExternalAsset, content: string, options?:↳
↳AssetContentOptions): string;
getAssetContent(file: ExternalAsset, content?: string): string | undefined;
writeBuffer(file: ExternalAsset, options?: WriteFileOptions): Buffer | null;
writeImage(document: string | string[], output: OutputFinalize<ExternalAsset>):↳
↳boolean;
compressFile(file: ExternalAsset, overwrite?: boolean): Promise<unknown>;
fetchObject(uri: string | URL, format: BufferFormat): Promise<object | null>;
fetchObject(uri: string | URL, options?: OpenOptions): Promise<object | null>;
fetchBuffer(uri: string | URL, options?: OpenOptions): Promise<Buffer | string |↳
↳null>;
fetchFiles(uri: string | URL, pathname: string): Promise<string[]>;
fetchFiles(uri: string | URL, options?: Aria2Options): Promise<string[]>;
updateProgress(name: "request", id: number | string, receivedBytes: number,↳
↳totalBytes: number, dataTime?: HighResolutionTime): void;
start(emptyDir?: boolean): Promise<FinalizeResult>;
processAssets(emptyDir?: boolean, using?: ExternalAsset[]): void;
deleteFile(src: string, promises: boolean): Promise<void>;
deleteFile(src: string, options: DeleteFileOptions & DeleteFileAddendum, promises:↳
↳boolean): Promise<void>;
deleteFile(src: string, callback?: NoParamCallback): unknown;
deleteFile(src: string, options: DeleteFileOptions & DeleteFileAddendum, callback?:↳
↳NoParamCallback): unknown;
restart(recursive?: boolean | "abort", emptyDir?: boolean): void;
restart(recursive?: boolean | "abort", exclusions?: string[], emptyDir?: boolean):↳

```

(continues on next page)

(continued from previous page)

```

↪void;
  finalizeCompress(assets: ExternalAsset[]): Promise<unknown>;
  finalizeDocument(): Promise<unknown>;
  finalizeTask(assets: (ExternalAsset & Required<TaskAction>)[]): Promise<unknown>;
  finalizeCloud(): Promise<unknown>;
  finalizeCleanup(): Promise<unknown>;
  finalize(): Promise<void>;
  close(): void;
  reset(): boolean;
  get baseDirectory(): string;
  get config(): RequestData;
  get assets(): ExternalAsset[];
  get incremental(): IncrementalMatch;
  set restarting(value);
  get restarting(): boolean;
  get delayed(): number;
  set cleared(value);
  get cleared(): boolean;
  set finalizeState(value);
  get finalizeState(): number;

  /* Set */
  add(value: string, parent?: ExternalAsset, type?: number): this;
  delete(value: string, emptyDir?: boolean): boolean;
  has(value: unknown): value is string;

  /* EventEmitter */
  on(event: "end", listener: PostFinalizeCallback): this;
  on(event: "exec", listener: (command: ExecCommand, options?: SpawnOptions) => void): ↪
↪this;
  on(event: "error", listener: (err: Error) => void): this;
  on(event: "file:read", listener: (src: string, data: Buffer | string, options?: ↪
↪ReadFileOptions) => void): this;
  on(event: "file:write", listener: (src: string, options?: WriteFileOptions) => ↪
↪void): this;
  on(event: "file:delete", listener: (src: string, options?: DeleteFileOptions) => ↪
↪void): this;
  on(event: "file:copy", listener: (dest: string, options?: CopyFileOptions) => void): ↪
↪this;
  on(event: "file:move", listener: (dest: string, options?: MoveFileOptions) => void): ↪
↪this;
  on(event: "dir:create", listener: (src: string, options?: CreateDirOptions) => ↪
↪void): this;
  on(event: "dir:remove", listener: (src: string, options?: RemoveDirOptions) => ↪
↪void): this;
  once(event: "end", listener: PostFinalizeCallback): this;
  once(event: "exec", listener: (command: ExecCommand, options?: SpawnOptions) => ↪
↪void): this;
  once(event: "error", listener: (err: Error) => void): this;
  once(event: "file:read", listener: (src: string, data: Buffer | string, options?: ↪
↪ReadFileOptions) => void): this;
  once(event: "file:write", listener: (src: string, options?: WriteFileOptions) => ↪

```

(continues on next page)

(continued from previous page)

```

↪void): this;
    once(event: "file:delete", listener: (src: string, options?: DeleteFileOptions) =>↪
↪void): this;
    once(event: "file:copy", listener: (dest: string, options?: CopyFileOptions) =>↪
↪void): this;
    once(event: "file:move", listener: (dest: string, options?: MoveFileOptions) =>↪
↪void): this;
    once(event: "dir:create", listener: (src: string, options?: CreateDirOptions) =>↪
↪void): this;
    once(event: "dir:remove", listener: (src: string, options?: RemoveDirOptions) =>↪
↪void): this;
    emit(event: "end", result: FinalizeResult): boolean;
    emit(event: "exec", command: ExecCommand, options?: SpawnOptions): boolean;
    emit(event: "error", err: Error): boolean;
    emit(event: "file:read", src: string, data: Buffer | string, options?:↪
↪ReadFileOptions): boolean;
    emit(event: "file:write", src: string, options?: WriteFileOptions): boolean;
    emit(event: "file:delete", src: string, options?: DeleteFileOptions): boolean;
    emit(event: "file:copy", dest: string, options?: CopyFileOptions): boolean;
    emit(event: "file:move", dest: string, options?: MoveFileOptions): boolean;
    emit(event: "dir:create", src: string, options?: CreateDirOptions): boolean;
    emit(event: "dir:remove", src: string, options?: RemoveDirOptions): boolean;
}

interface FileManagerConstructor extends HostConstructor {
    purgeMemory(percent?: number, limit?: number | boolean, parent?: number | boolean):↪
↪Promise<number>;
    loadSettings(settings: Settings, password?: string): boolean;
    loadSettings(settings: Settings, permission?: PermissionReadWrite, password?:↪
↪string): boolean;
    sanitizeAssets(assets: ExternalAsset[], exclusions?: string[]): ExternalAsset[];
    writeChecksum(root: string, options: ChecksumOptions): Promise<string[]>;
    writeChecksum(root: string, to?: string, options?: ChecksumOptions): Promise
↪<string[] | null>;
    verifyChecksum(root: string, options: ChecksumOptions): Promise<[string[], string[],↪
↪number] | null>;
    verifyChecksum(root: string, from?: string, options?: ChecksumOptions): Promise
↪<[string[], string[], number] | null>;
    createFileThread(host: IFileManager, file: ExternalAsset): IFileThread;
    setTimeout(options: Record<string, number | string>): void;
    defineHttpCache(options: HttpMemorySettings, disk?: boolean): void;
    defineHttpConnect(options: HttpConnectSettings): void;
    readonly prototype: IFileManager;
    new(baseDirectory: string, config: RequestData, postFinalize?:↪
↪PostFinalizeCallback): IFileManager;
    new(baseDirectory: string, config: RequestData, permission?: IPermission | null,↪
↪postFinalize?: PostFinalizeCallback): IFileManager;
}

```

Added in version 0.9.0:

- *IFileManager* method **install** with **name** “image” and **target** as *ImageConstructor*.
- *IFileManager* method **install** with **name** “document” | “image” | “task” and **handler** as *string*.

- *IFileManager* method **transformAsset** *optional* argument **override** as *boolean* was created.
- *IFileManager* method **transformAsset** return value **Promise<void>** was modified to *Promise<boolean>*.
- *IFileManager* methods were created:

– `scheduleTask` – `setTaskLimit` – `updateProgress`

8.6.2 Settings

Listing 16: View JSON

```
interface ProcessModule {
  thread?: {
    sub_limit?: number;
  };
}

interface RequestModule {
  timeout?: number | string;
  disk?: {
    enabled?: boolean;
    expires?: number | string;
    limit?: number | string;
    include?: string[];
    exclude?: string[];
  };
  buffer?: {
    enabled?: boolean;
    expires?: number | string;
    limit?: number | string;
    include?: string[];
    exclude?: string[];
    limit_all?: number | string;
    purge_amount?: number | string;
    to_disk?: number | string | [number | string, (number | string)?];
  };
  connect?: {
    timeout?: number | string;
    retry_wait?: number | string;
    retry_after?: number | string;
    retry_limit?: number;
    redirect_limit?: number;
  };
}

interface ErrorModule {
  recursion_limit?: number;
}

interface LoggerModule {
  session_id?: boolean | number;
}
```


Added in version 0.9.0:

- *ProcessModule* setting **thread.sub_limit** for maximum simultaneous downloads was created.

Example usage

```
const FileManager = require("@e-mc/file-manager");

FileManager.loadSettings({ // Global
  process: {
    thread: { sub_limit: 16 }
  },
  request: {
    timeout: "15s",
    disk: {
      enabled: true,
      limit: "1gb", // Content-Length
      expires: "1d",
      exclude: ["https://github.com", "zip"]
    },
    buffer: {
      enabled: true,
      limit: "64mb",
      limit_all: "512mb",
      expires: "1h",
      purge_amount: 0.25 // When limit_all exceeded
    }
  },
  permission: {
    disk_read: ["**/*"],
    disk_write: ["/tmp/**"]
  }
});

const requestData = {
  assets: [
    { pathname: "output", filename: "image1.png", uri: "http://hostname/path/document1.png" },
    { pathname: "output", filename: "image2.png", uri: "http://hostname/path/document2.png" }
  ],
  incremental: "etag",
  threads: 8,
  log: { showSize: true, showProgress: true }
};

const instance = new FileManager("/path/workspace", requestData, { disk_write: ["/path/workspace/output/**"] });
await instance.start();
```

Caution: *FileManager* is a sub-class of *Host* and *Module*. Their `loadSettings` will be called as well which forms a combined *Settings* object.

8.6.3 References

- <https://www.unpkg.com/@e-mc/types/lib/squared.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/asset.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/core.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/filemanager.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/logger.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/module.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/node.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/request.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/settings.d.ts>
- <https://www.npmjs.com/package/@types/node>

8.7 @e-mc/image

- `npm i @e-mc/image`

8.7.1 Interface

Listing 17: View Source

```
import type { IHost, ModuleConstructor } from "./index";
import type { IFileThread } from "./asset";
import type { CommandData, CropData, QualityData, ResizeData, RotateData,
↳ TransformOptions } from "./image";
import type { ImageModule } from "./settings";

interface IImage extends IClient<IHost, ImageModule> {
  resizeData?: ResizeData;
  cropData?: CropData;
  rotateData?: RotateData;
  qualityData?: QualityData;
  methodData?: [string, unknown[]][];
  opacityValue?: number;
  setCommand(value: string | CommandData, outputAs?: string): void;
  getCommand(): string;
  parseCommand(value: string): CommandData;
  parseMethod(value: string): [string, unknown[]][] | undefined;
  parseResize(value: string): ResizeData | undefined;
  parseCrop(value: string): CropData | undefined;
  parseRotate(value: string): RotateData | undefined;
  parseQuality(value: string): QualityData | undefined;
  parseOpacity(value: string): number;
  using?(data: IFileThread, command: string): Promise<unknown>;
  get outputAs(): string;
}
```

(continues on next page)

(continued from previous page)

```

interface ImageConstructor extends ModuleConstructor {
  readonly REGEXP_SIZERANGE: RegExp;
  transform(file: string | Buffer, command: string, options: { tempFile: true }):
    ↳Promise<string>;
  transform(file: string | Buffer, command: string, options?: TransformOptions):
    ↳Promise<Buffer | null>;
  clamp(value: unknown, min?: number, max?: number): number;
  isBinary(mime: unknown): mime is string;
  toABGR(buffer: Uint8Array | Buffer): Buffer;
  readonly prototype: IImage;
  new(module?: ImageModule): IImage;
}

```

8.7.2 Settings

Listing 18: View JSON

```

import type { PermittedDirectories } from "../core";

interface ImageModule {
  // handler: "@pi-r/jimp";
  webp?: string;
  settings?: {
    broadcast_id?: string | string[];
    cache?: boolean;
    jimp?: {
      exec?: {
        uid?: number;
        gid?: number;
      };
      cache_expires?: number | string;
      rotate_clockwise?: boolean;
    };
    webp?: {
      path?: string;
      cwebp?: string[];
      gif2webp?: string[];
    };
  };
  permission?: PermittedDirectories;
}

```

Example usage

- `@pi-r/jimp`

Note: Usage without a **Host** is conducted through static methods. The **using** class method is called by the **Host** to perform the transformation.

8.7.3 References

- <https://www.unpkg.com/@e-mc/types/lib/asset.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/image.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/settings.d.ts>

8.8 @e-mc/module

- `npm i @e-mc/module`

8.8.1 Interface

Listing 19: View Source

```
import type { LogStatus } from "./squared";

import type { IHost } from "./index";
import type { IAbortComponent, IPermission } from "./core";
import type { LOG_TYPE, STATUS_TYPE, ExecCommand, LogArguments, LogComponent, LogDate,
↳LogFailOptions, LogMessageOptions, LogOptions, LogProcessOptions, LogTime, LogType,
↳LogValue, LoggerFormat, StatusType } from "./logger";
import type { AsHashOptions, CheckSemVerOptions, CopyDirOptions, CopyDirResult,
↳CopyFileOptions, CreateDirOptions, DeleteFileOptions, GetTempDirOptions,
↳MoveFileOptions, NormalizeFlags, ParseFunctionOptions, PermissionOptions, ProtocolType,
↳ReadBufferOptions, ReadFileCallback, ReadFileOptions, ReadHashOptions,
↳ReadTextOptions, RemoveDirOptions, WriteFileOptions } from "./module";
import type { Settings } from "./node";
import type { LoggerFormatSettings } from "./settings";

import type { SpawnOptions } from "child_process";
import type { BinaryLike } from "crypto";
import type { FileTypeResult } from "file-type";
import type { NoParamCallback } from "fs";

import type * as EventEmitter from "events";

type BufferView = Buffer | string | NodeJS.ArrayBufferView;
type CpuUsage = NodeJS.CpuUsage;

interface IModule extends EventEmitter, IAbortComponent {
```

(continues on next page)

(continued from previous page)

```

readonly status: LogStatus<StatusType>[];
readonly errors: unknown[];
supported(major: number, minor?: number, patch?: number, lts?: boolean): boolean;
supports(name: string, value?: boolean): boolean;
getTempDir(options: GetTempDirOptions): string;
getTempDir(uuidDir: boolean, createDir: boolean): string;
getTempDir(pathname: string, createDir: boolean): string;
getTempDir(uuidDir: boolean, filename?: string, createDir?: boolean): string;
getTempDir(pathname?: string, filename?: string, createDir?: boolean): string;
canRead(uri: string | URL, options?: PermissionOptions): boolean;
canWrite(uri: string | URL, options?: PermissionOptions): boolean;
readFile(src: string | URL): Buffer | undefined;
readFile(src: string | URL, options?: ReadFileOptions): Promise<Buffer | string> |
↳ Buffer | string | undefined;
readFile(src: string | URL, promises: true): Promise<Buffer | undefined>;
readFile(src: string | URL, options: ReadFileOptions, promises: true): Promise
↳ <Buffer | string | undefined>;
readFile(src: string | URL, callback: ReadFileCallback<Buffer | string>): Buffer |
↳ string | undefined;
readFile(src: string | URL, options: ReadFileOptions, callback: ReadFileCallback
↳ <Buffer | string>): Buffer | string | undefined;
writeFile(src: string | URL, data: BufferView, options?: WriteFileOptions): boolean;
writeFile(src: string | URL, data: BufferView, promises: true): Promise<boolean>;
writeFile(src: string | URL, data: BufferView, options: WriteFileOptions, promises:
↳ true): Promise<boolean>;
writeFile(src: string | URL, data: BufferView, callback: NoParamCallback): void;
writeFile(src: string | URL, data: BufferView, options: WriteFileOptions, callback:
↳ NoParamCallback): void;
deleteFile(src: string | URL, options?: DeleteFileOptions): boolean;
deleteFile(src: string | URL, promises: true): Promise<boolean>;
deleteFile(src: string | URL, options: DeleteFileOptions, promises: true): Promise
↳ <boolean>;
deleteFile(src: string | URL, callback: NoParamCallback): void;
deleteFile(src: string | URL, options: DeleteFileOptions, callback:
↳ NoParamCallback): void;
copyFile(src: string | URL, dest: string | URL, options?: CopyFileOptions): boolean;
copyFile(src: string | URL, dest: string | URL, promises: true): Promise<boolean>;
copyFile(src: string | URL, dest: string | URL, options: CopyFileOptions, promises:
↳ true): Promise<boolean>;
copyFile(src: string | URL, dest: string | URL, callback: NoParamCallback): void;
copyFile(src: string | URL, dest: string | URL, options: CopyFileOptions, callback:
↳ NoParamCallback): void;
moveFile(src: string | URL, dest: string | URL, options?: MoveFileOptions): boolean;
moveFile(src: string | URL, dest: string | URL, promises: true): Promise<boolean>;
moveFile(src: string | URL, dest: string | URL, options: MoveFileOptions, promises:
↳ true): Promise<boolean>;
moveFile(src: string | URL, dest: string | URL, callback: NoParamCallback): void;
moveFile(src: string | URL, dest: string | URL, options: MoveFileOptions, callback:
↳ NoParamCallback): void;
createDir(src: string | URL, options?: CreateDirOptions): boolean;
createDir(src: string | URL, promises: true): Promise<boolean>;
createDir(src: string | URL, options: CreateDirOptions, promises: true): Promise

```

(continues on next page)

(continued from previous page)

```

↳<boolean>;
  createDir(src: string | URL, callback: NoParamCallback): void;
  createDir(src: string | URL, options: CreateDirOptions, callback: NoParamCallback):
↳void;
  removeDir(src: string | URL, options?: RemoveDirOptions): boolean;
  removeDir(src: string | URL, promises: true): Promise<boolean>;
  removeDir(src: string | URL, options: RemoveDirOptions, promises: true): Promise
↳<boolean>;
  removeDir(src: string | URL, callback: NoParamCallback): void;
  removeDir(src: string | URL, options: RemoveDirOptions, callback: NoParamCallback):
↳void;
  allSettled(values: readonly PromiseLike<unknown>[], rejected?: LogValue, type?:
↳LogType): Promise<PromiseFulfilledResult<unknown>[]>;
  allSettled(values: readonly PromiseLike<unknown>[], rejected?: LogValue, options?:
↳LogFailOptions): Promise<PromiseFulfilledResult<unknown>[]>;
  formatMessage(type: LogType, title: string, value: LogValue, message?: unknown,
↳options?: LogMessageOptions): void;
  formatFail(type: LogType, title: string, value: LogValue, message?: unknown, options?
↳: LogFailOptions): void;
  writeFail(value: LogValue, message?: unknown, type?: LogType): void;
  writeFail(value: LogValue, message?: unknown, options?: LogFailOptions): void;
  writeTimeProcess(title: string, value: string, startTime: LogTime, options?:
↳LogProcessOptions): void;
  writeTimeElapsed(title: string, value: LogValue, startTime: LogTime, options?:
↳LogMessageOptions): void;
  checkPackage(err: unknown, name: string | undefined, options: LogType): boolean;
  checkPackage(err: unknown, name: string | undefined, options: LogFailOptions):
↳boolean;
  checkPackage(err: unknown, name: string | undefined, value?: LogValue, options?:
↳LogFailOptions | LogType): boolean;
  checkFail(message: unknown, options: LogFailOptions): LogArguments | false |
↳undefined;
  writeLog(component: LogComponent, queue?: boolean): void;
  writeLog(type: StatusType, value: unknown, options: LogOptions): void;
  writeLog(type: StatusType, value: unknown, timeStamp?: LogDate, duration?: number):
↳void;
  addLog(component: LogComponent, queue?: boolean): void;
  addLog(type: StatusType, value: unknown, options: LogOptions): void;
  addLog(type: StatusType, value: unknown, from: string, source?: string): void;
  addLog(type: StatusType, value: unknown, timeStamp?: LogDate, from?: string, source?
↳: string): void;
  addLog(type: StatusType, value: unknown, timeStamp?: LogDate, duration?: number,
↳from?: string, source?: string): void;
  getLog(...type: StatusType[]): LogStatus<StatusType>[];
  flushLog(): void;
  willAbort(value: unknown): boolean;
  hasOwnPermission(): boolean;
  isFatal(err?: unknown): boolean;
  detach(): void;
  reset(): void;
  get moduleName(): string;
  set host(value);

```

(continues on next page)

(continued from previous page)

```

get host(): IHost | null;
set permission(value);
get permission(): IPermission | null;
get aborted(): boolean;
set abortable(value);
get abortable(): boolean;
get threadable(): boolean;
set sessionId(value);
get sessionId(): string;
set broadcastId(value);
get broadcastId(): string | string[];
get logType(): LOG_TYPE;
set logLevel(value: number | string);
get logLevel(): number;
get statusType(): STATUS_TYPE;
set tempDir(value);
get tempDir(): string;

/* EventEmitter */
on(event: "exec", listener: (command: ExecCommand, options?: SpawnOptions) => void):
↳ this;
on(event: "error", listener: (err: Error) => void): this;
on(event: "file:read", listener: (src: string, data: Buffer | string, options?:
↳ ReadFileOptions) => void): this;
on(event: "file:write", listener: (src: string, options?: WriteFileOptions) =>
↳ void): this;
on(event: "file:delete", listener: (src: string, options?: DeleteFileOptions) =>
↳ void): this;
on(event: "file:copy", listener: (dest: string, options?: CopyFileOptions) => void):
↳ this;
on(event: "file:move", listener: (dest: string, options?: MoveFileOptions) => void):
↳ this;
on(event: "dir:create", listener: (src: string, options?: CreateDirOptions) =>
↳ void): this;
on(event: "dir:remove", listener: (src: string, options?: RemoveDirOptions) =>
↳ void): this;
once(event: "exec", listener: (command: ExecCommand, options?: SpawnOptions) =>
↳ void): this;
once(event: "error", listener: (err: Error) => void): this;
once(event: "file:read", listener: (src: string, data: Buffer | string, options?:
↳ ReadFileOptions) => void): this;
once(event: "file:write", listener: (src: string, options?: WriteFileOptions) =>
↳ void): this;
once(event: "file:delete", listener: (src: string, options?: DeleteFileOptions) =>
↳ void): this;
once(event: "file:copy", listener: (dest: string, options?: CopyFileOptions) =>
↳ void): this;
once(event: "file:move", listener: (dest: string, options?: MoveFileOptions) =>
↳ void): this;
once(event: "dir:create", listener: (src: string, options?: CreateDirOptions) =>
↳ void): this;
once(event: "dir:remove", listener: (src: string, options?: RemoveDirOptions) =>
↳ void): this;

```

(continues on next page)

(continued from previous page)

```

    ↪void): this;
    emit(event: "exec", command: ExecCommand, options?: SpawnOptions): boolean;
    emit(event: "error", err: Error): boolean;
    emit(event: "file:read", src: string, data: Buffer | string, options?: ↪
    ↪ReadFileOptions): boolean;
    emit(event: "file:write", src: string, options?: WriteFileOptions): boolean;
    emit(event: "file:delete", src: string, options?: DeleteFileOptions): boolean;
    emit(event: "file:copy", dest: string, options?: CopyFileOptions): boolean;
    emit(event: "file:move", dest: string, options?: MoveFileOptions): boolean;
    emit(event: "dir:create", src: string, options?: CreateDirOptions): boolean;
    emit(event: "dir:remove", src: string, options?: RemoveDirOptions): boolean;
}

interface ModuleConstructor {
    PROCESS_TIMEOUT: number;
    LOG_STYLE_FAIL: LogMessageOptions;
    LOG_STYLE_SUCCESS: LogMessageOptions;
    LOG_STYLE_INFO: LogMessageOptions;
    LOG_STYLE_WARN: LogMessageOptions;
    LOG_STYLE_NOTICE: LogMessageOptions;
    LOG_STYLE_REVERSE: LogMessageOptions;
    readonly VERSION: string;
    readonly LOG_TYPE: LOG_TYPE;
    readonly LOG_FORMAT: LoggerFormatSettings<LoggerFormat<number>>;
    readonly STATUS_TYPE: STATUS_TYPE;
    readonly MAX_TIMEOUT: number;
    readonly TEMP_DIR: string;
    supported(major: number, minor?: number, patch?: number, lts?: boolean): boolean;
    formatMessage(type: LogType, title: string, value: LogValue, message?: unknown, ↪
    ↪options?: LogMessageOptions): void;
    writeFail(value: LogValue, message?: unknown, options?: LogFailOptions | LogType): ↪
    ↪void;
    enabled(key: string, username?: string): boolean;
    parseFunction(value: unknown, options?: ParseFunctionOptions): ((...args: unknown[]) ↪
    ↪=> Promise<unknown> | unknown) | null;
    parseFunction(value: unknown, absolute: boolean, sync?: boolean): ((...args: ↪
    ↪unknown[]) => Promise<unknown> | unknown) | null;
    asString(value: unknown, cacheKey?: boolean | "throws"): string;
    asHash(data: BinaryLike, minLength: number): string;
    asHash(data: BinaryLike, algorithm: string, minLength?: number): string;
    asHash(data: BinaryLike, algorithm?: string, options?: AsHashOptions): string;
    asHash(data: BinaryLike, options?: AsHashOptions): string;
    readHash(value: string | URL, options?: ReadHashOptions): Promise<string>;
    toPosix(value: unknown, normalize: boolean): string;
    toPosix(value: unknown, filename?: string, normalize?: boolean): string;
    hasLogType(value: LogType): boolean;
    isURL(value: string, ...exclude: string[]): boolean;
    isFile(value: string | URL, type?: ProtocolType): boolean;
    isDir(value: string | URL): boolean;
    isPath(value: string | URL, type?: "unc" | "unc-exists"): boolean;
    isPath(value: string | URL, isFile?: boolean): boolean;
    isErrorCode(err: unknown, ...code: string[]): boolean;

```

(continues on next page)

(continued from previous page)

```

fromLocalPath(value: string): string;
resolveFile(value: string): string;
resolvePath(value: string, base: string | URL): string;
joinPath(...values: [...paths: unknown[], normalize: boolean][]): string;
joinPath(...values: unknown[]): string;
normalizePath(value: unknown, flags?: boolean | NormalizeFlags): string;
createDir(value: string | URL, overwrite?: boolean): boolean;
removeDir(value: string | URL, sinceCreated: number, recursive?: boolean): boolean;
removeDir(value: string | URL, empty?: boolean, recursive?: boolean): boolean;
copyDir(src: string | URL, dest: string | URL, move?: boolean, recursive?: boolean): Promise<CopyDirResult>;
↳ copyDir(src: string | URL, dest: string | URL, options?: CopyDirOptions): Promise
↳ <CopyDirResult>;
renameFile(src: string | URL, dest: string | URL, throws?: boolean): boolean;
streamFile(value: string | URL, cache: boolean): Promise<Buffer | string>;
streamFile(value: string | URL, options: ReadBufferOptions): Promise<Buffer | string>;
↳;
streamFile(value: string | URL, cache?: boolean | ReadBufferOptions, options?:
↳ ReadBufferOptions): Promise<Buffer | string>;
readText(value: string | URL, cache: boolean): string;
readText(value: string | URL, options: ReadTextOptions): Promise<string> | string;
readText(value: string | URL, encoding?: BufferEncoding | ReadTextOptions, cache?:
↳ boolean): string;
readBuffer(value: string | URL, options: ReadBufferOptions): Promise<Buffer | null>;
↳ Buffer | null;
readBuffer(value: string | URL, cache?: boolean | ReadBufferOptions): Buffer | null;
resolveMime(data: string | Buffer | Uint8Array | ArrayBuffer): Promise
↳ <FileTypeResult | undefined>;
lookupMime(value: string, extension?: boolean): string;
initCpuUsage(instance?: IModule): CpuUsage;
getCpuUsage(start: CpuUsage, format: true): string;
getCpuUsage(start: CpuUsage, format?: boolean): number;
getMemUsage(format: true): string;
getMemUsage(format?: boolean): number;
formatCpuMem(start: CpuUsage, all?: boolean): string;
getPackageVersion(name: string | [string, string], startDir: string, baseDir?:
↳ string): string;
getPackageVersion(name: string | [string, string], unstable?: boolean, startDir?:
↳ string, baseDir?: string): string;
checkSemVer(name: string | [string, string], options: CheckSemVerOptions): boolean;
checkSemVer(name: string | [string, string], min: number | string, max?: number |
↳ string, unstable?: boolean, startDir?: string): boolean;
checkSemVer(name: string | [string, string], min: number | string, max: number |
↳ string, options?: CheckSemVerOptions): boolean;
sanitizeCmd(value: string): string;
sanitizeArgs(value: string, doubleQuote?: boolean): string;
sanitizeArgs(values: string[], doubleQuote?: boolean): string[];
purgeMemory(percent: number, parent: boolean): Promise<number>;
purgeMemory(percent: number, limit: number, parent?: boolean): Promise<number>;
purgeMemory(percent?: number, limit?: number | boolean, parent?: unknown): Promise
↳ <number>;
canWrite(name: "temp" | "home"): boolean;

```

(continues on next page)

(continued from previous page)

```
loadSettings(settings: Settings, password?: string): boolean;
readonly prototype: IModule<IHost>;
new(): IModule<IHost>;
}
```

Added in version 0.9.0:

- *IModule* static property **LOG_FORMAT** was created.
- *IModule* method **src** and **dest** arguments can accept *URL* object:

– canRead	– writeFile	– moveFile	– streamFile (<i>static</i>)
– canWrite	– deleteFile	– createDir	
– readFile	– copyFile	– removeDir	

Added in version 0.8.7:

- *IModule* method **getPackageVersion** optional argument **baseDir** as *string* was created.

8.8.2 Settings

Listing 20: View JSON

```
import type { LogMessageOptions, LogTypeValue, LoggerStatus } from "./logger";
import type { LoggerProcessSettings } from "./settings";

import type { BackgroundColor as IBackgroundColor, ForegroundColor as IForegroundColor } from "chalk";
import type { BinaryLike, CipherGCMTypes } from "crypto";
import type { SecureVersion } from "tls";

interface NodeModule {
  process?: {
    cpu_usage?: boolean;
    memory_usage?: boolean;
    inline?: boolean;
  };
  require?: {
    ext?: string | string[] | boolean;
    npm?: boolean;
    inline?: boolean;
  };
}

interface ProcessModule {
  env?: {
    apply?: boolean;
  };
  cipher?: {
    algorithm?: CipherGCMTypes;
    key?: BinaryLike;
    iv?: BinaryLike;
  };
}
```

(continues on next page)

(continued from previous page)

```

    };
    password?: string;
}

interface MemoryModule {
  settings?: {
    users?: boolean | string[];
    cache_disk?: {
      enabled?: boolean;
      min_size?: number | string;
      max_size?: number | string;
      include?: string[];
      exclude?: string[];
      expires?: number | string;
    };
  };
};

interface PermissionModule {
  home_read?: boolean;
  home_write?: boolean;
  process_exec?: (string | ExecOptions)[];
}

interface ErrorModule {
  out?: string | (err: Error, data: LogTypeValue, require?: NodeRequire) => void;
  fatal?: boolean;
}

interface TempModule {
  dir?: string;
  write?: boolean;
}

interface LoggerModule {
  enabled?: boolean;
  level?: number;
  production?: string[];
  format?: {
    title?: {
      width?: number;
      color?: ForegroundColor;
      bg_color?: BackgroundColor;
      bold?: boolean;
      justify?: "left" | "center" | "right";
      braces?: string;
      as?: StringMap;
    };
  };
  value?: {
    width?: number;
    color?: ForegroundColor;
    bg_color?: BackgroundColor;
  };
}

```

(continues on next page)

(continued from previous page)

```

        bold?: boolean;
        justify?: "left" | "center" | "right";
    },
    hint?: {
        width?: number;
        color?: ForegroundColor;
        bg_color?: BackgroundColor;
        bold?: boolean;
        braces?: [string, string];
        as?: StringMap;
        unit?: "auto" | "s" | "ms";
    };
    message?: {
        width?: number;
        color?: ForegroundColor;
        bg_color?: BackgroundColor;
        bold?: boolean;
        braces?: [string, string];
    };
    meter?: {
        color?: ForegroundColor;
        bg_color?: BackgroundColor;
        bg_alt_color?: BackgroundColor;
        bold?: boolean;
    };
    error?: {
        color?: ForegroundColor;
        alt_color?: ForegroundColor;
        bg_color?: BackgroundColor;
        braces?: [string, string];
    };
};
meter?: {
    http?: number;
    image?: number;
    compress?: number;
    process?: number;
};
broadcast?: {
    enabled?: boolean;
    out?: string | (value: string, options: LogMessageOptions, require?: NodeRequire) => void;
    color?: boolean;
    port?: number | number[];
    secure?: {
        port?: number | number[];
        ca?: string;
        key?: string;
        cert?: string;
        version?: SecureVersion
    };
};
};

```

(continues on next page)

(continued from previous page)

```

color?: boolean;
message?: boolean;
stdout?: boolean;
abort?: boolean;
status?: boolean | LoggerStatus;
unknown?: boolean | LoggerColor;
system?: boolean | LoggerColor;
process?: boolean | LoggerProcessSettings;
image?: boolean | LoggerColor;
compress?: boolean | LoggerColor;
watch?: boolean | LoggerColor;
file?: boolean | LoggerColor;
cloud?: boolean | LoggerColor;
db?: boolean | LoggerColor;
time_elapsed?: boolean | LoggerColor;
time_process?: boolean | LoggerColor;
exec?: boolean | LoggerColor;
http?: boolean | LoggerColor;
node?: boolean | LoggerColor;
session_id?: boolean | number;
stack_trace?: boolean | number;
}

type BackgroundColor = typeof IBackgroundColor | `${string}`;
type ForegroundColor = typeof IForegroundColor | `${string}`;

```

Added in version 0.10.0:

- *LoggerModule* group **format** block *error* was created.
- *LoggerModule* group **format** property **braces** were implemented.

Added in version 0.8.6:

- *PermissionModule* properties **home_read** | **home_write** were implemented.

8.8.3 References

- <https://www.unpkg.com/@e-mc/types/lib/core.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/logger.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/module.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/node.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/settings.d.ts>
- <https://www.npmjs.com/package/@types/node>
- <https://www.npmjs.com/package/chalk>

8.9 @e-mc/request

- `npm i @e-mc/request`

8.9.1 Interface

Listing 21: View Source

```
import type { IModule, ModuleConstructor } from "./index";
import type { HttpAgentSettings, HttpProtocolVersion, HttpClient,
  ↪InternetProtocolVersion } from "./http";
import type { ApplyOptions, Aria2Options, FormDataPart, HeadersOnCallback, HostConfig,
  ↪OpenOptions, PostOptions, ProxySettings, ReadExpectType, RequestInit, StatusOnCallback,
  ↪} from "./request";
import type { DnsLookupSettings, RequestModule, RequestSettings } from "./settings";

import type { ClientRequest, OutgoingHttpHeaders } from "http";
import type { LookupFunction } from "net";
import type { Writable } from "stream";

interface IRequest extends IModule {
  module: RequestModule;
  startTime: number;
  acceptEncoding: boolean;
  keepAlive: boolean | null;
  readTimeout: number;
  readExpect: ReadExpectType;
  proxy: ProxySettings | null;
  init(config?: RequestInit): this;
  apply(options: ApplyOptions): this;
  addDns(hostname: string, address: string, timeout: number): void;
  addDns(hostname: string, address: string, family?: string, timeout?: number): void;
  lookupDns(hostname: string): LookupFunction;
  proxyOf(uri: string, localhost?: boolean): ProxySettings | undefined;
  statusOn(name: number | number[], callback: StatusOnCallback): void;
  statusOn(name: number | number[], globUrl: string, callback: StatusOnCallback): void;
  headersOn(name: string | string[], callback: HeadersOnCallback): void;
  headersOn(name: string | string[], globUrl: string, callback: HeadersOnCallback):
  ↪void;
  headersOf(uri: string): OutgoingHttpHeaders | undefined;
  aria2c(uri: string | URL, pathname: string): Promise<string[]>;
  aria2c(uri: string | URL, options?: Aria2Options): Promise<string[]>;
  json(uri: string | URL, options?: OpenOptions): Promise<object | null>;
  pipe(uri: string | URL, to: Writable, options?: OpenOptions): Promise<null>;
  opts(url: string | URL, options?: OpenOptions): HostConfig;
  open(uri: string | URL, options: OpenOptions): HttpClient;
  head(uri: string | URL, options?: OpenOptions): ClientRequest;
  post(uri: string | URL, data: unknown, contentType: string): Promise<Buffer | string,
  ↪| null>;
  post(uri: string | URL, parts: FormDataPart[]): Promise<Buffer | string | null>;
  post(uri: string | URL, form: Record<string, unknown>, parts: FormDataPart[]):
  ↪Promise<Buffer | string | null>;
```

(continues on next page)

(continued from previous page)

```

    post(uri: string | URL, data: unknown, options: PostOptions): Promise<Buffer |
↳string | null>;
    post(uri: string | URL, data: unknown, contentType?: string, options?: PostOptions):
↳Promise<Buffer | string | null>;
    get(uri: string | URL, options?: OpenOptions): Promise<Buffer | object | string |
↳null>;
    detach(singleton?: boolean): void;
    reset(): void;
    close(): void;
    set agentTimeout(value);
    get agentTimeout(): number;
    set httpVersion(value);
    get httpVersion(): HttpProtocolVersion | null;
    set ipVersion(value);
    get ipVersion(): InternetProtocolVersion;
    get settings(): RequestSettings;
}

interface RequestConstructor extends ModuleConstructor {
    readCACert(value: string, cache?: boolean): string;
    readTLSKey(value: string, cache?: boolean): string;
    readTLSCert(value: string, cache?: boolean): string;
    isCert(value: string): boolean;
    fromURL(url: URL, value: string): string;
    fromStatusCode(value: number | string): string;
    defineHttpAgent(options: HttpAgentSettings): void;
    defineDnsLookup(options: DnsLookupSettings, clear?: boolean): void;
    getAria2Path(): string;
    readonly prototype: IRequest;
    new(module?: RequestModule): IRequest;
}

```

Removed in version 0.9.0:

- *RequestInit* property **requestTimeout** was renamed *readTimeout*.

Added in version 0.8.2:

- *IRequest* method **statusOn** was created.

Added in version 0.8.1:

- *IRequest* method **headersOn** was created.

8.9.2 Settings

Listing 22: View JSON

```

import type { PermittedDirectories } from "./core";
import type { SecureConfig } from "./http";
import type { PurgeComponent } from "./settings";

import type { LookupAddress } from "dns";

```

(continues on next page)

(continued from previous page)

```

import type { OutgoingHttpHeaders } from "http";

interface RequestModule {
  handler: "@e-mc/request";
  timeout?: number | string;
  read_timeout?: number | string;
  agent?: {
    keep_alive?: boolean;
    timeout?: number | string;
  };
  connect?: {
    timeout?: number | string;
    retry_wait?: number | string;
    retry_after?: number | string;
    retry_limit?: number;
    redirect_limit?: number;
  };
  dns?: {
    family?: number;
    expires?: number | string;
    resolve?: Record<string, Partial<LookupAddress>>;
  };
  use?: {
    http_version?: 1 | 2;
    accept_encoding?: boolean;
  };
  proxy?: {
    address?: string;
    port?: number;
    username?: string;
    password?: string;
    include?: string[];
    exclude?: string[];
    keep_alive?: boolean;
  };
  headers: Record<string, OutgoingHttpHeaders>;
  certs?: Record<string, SecureConfig<string | string[]>>;
  localhost?: string[];
  protocol?: {
    "http/1.1"?: string[];
    h2c?: string[];
    h2?: string[];
  };
  post_limit?: number | string;
  settings?: {
    broadcast_id?: string | string[];
    time_format?: "readable" | "relative" | "none";
    purge?: PurgeComponent;
  }
}

interface DownloadModule {

```

(continues on next page)

(continued from previous page)

```

expires?: number | string;
aria2?: {
  bin?: string | false;
  exec?: {
    uid?: number;
    gid?: number;
  };
  update_status?: number | { interval?: number; broadcast_only?: boolean };
  max_concurrent_downloads?: number;
  max_connection_per_server?: number;
  bt_stop_timeout?: number;
  bt_tracker_connect_timeout?: number;
  bt_tracker_timeout?: number;
  min_split_size?: string;
  disk_cache?: number | string;
  lowest_speed_limit?: number | string;
  always_resume?: boolean;
  file_allocation?: "none" | "prealloc" | "trunc" | "falloc";
  conf_path?: string;
};
}

```

Example usage

```

const Request = require("@e-mc/request");

const instance = new Request({
  read_timeout: 30,
  connect: {
    timeout: 20, // Seconds
    retry_wait: 1,
    retry_after: 30,
    retry_limit: 3, // Max attempts
    redirect_limit: 10
  },
  use: {
    http_version: 2,
    accept_encoding: true
  },
  dns: {
    family: 4 // ipVersion
  },
  agent: { keep_alive: true }
});
request.init({ ipVersion: 6 });

const options = {
  format: "yaml",
  httpVersion: 1,
  silent: true,

```

(continues on next page)

(continued from previous page)

```

    headers: { "x-goog-user-project": "project-1" }
  };
instance.get("http://hostname/path/config.yml", options).then(data => {
  console.log(data.property);
});

```

8.9.3 References

- <https://www.unpkg.com/@e-mc/types/lib/http.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/request.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/settings.d.ts>
- <https://www.npmjs.com/package/@types/node>

8.10 @e-mc/task

- `npm i @e-mc/task`

8.10.1 Interface

Listing 23: View Source

```

import type { IFileManager, IHost, ModuleConstructor } from "../index";
import type { ExternalAsset, IFileThread } from "../asset";
import type { IClient } from "../core";
import type { TaskModule } from "../settings";
import type { Command, SpawnResult } from "../task";

interface ITask extends IClient<IHost, TaskModule> {
  using?(data: IFileThread): Promise<unknown>;
  collect?(items: unknown[], preceding?: boolean): Promise<SpawnResult>[];
  map?(tasks: Command[]): Promise<SpawnResult | void>[];
  series?(tasks: Command[]): Promise<unknown>;
  parallel?(tasks: Command[]): Promise<unknown>;
  spawn?(task: PlainObject, callback: (result?: SpawnResult) => void): void;
  execute?(manager: IFileManager, task: PlainObject, callback: (value?: unknown) =>
↳ void): void;
}

interface TaskConstructor extends ModuleConstructor {
  finalize(this: IHost, instance: ITask, assets: ExternalAsset[]): Promise<unknown>;
  readonly prototype: ITask;
  new(module?: TaskModule, ...args: unknown[]): ITask;
}

```

8.10.2 Settings

Listing 24: View JSON

```
import type { PermittedDirectories } from "../core";

interface TaskModule {
  // handler: "@pi-r/gulp";
  settings?: {
    broadcast_id?: string | string[];
    users?: Record<string, Record<string, unknown>>;
    exec?: {
      uid?: number;
      gid?: number;
    };
  };
  permission?: PermittedDirectories;
}
```

Example usage

- *@pi-r/gulp*

Note: Usage without a **Host** is conducted through static methods. The **using** class method is called by the **Host** to perform the transformation.

8.10.3 References

- <https://www.unpkg.com/@e-mc/types/lib/asset.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/core.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/settings.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/task.d.ts>

8.11 @e-mc/types

- `npm i @e-mc/types`

8.11.1 Interface

Listing 25: View Source

```

import type { LogArguments } from "./lib/logger";
import type { CloneObjectOptions } from "./lib/module";

import type { BytesOptions } from "bytes";
import type { BinaryLike, CipherGCMTypes, Encoding, RandomUUIDOptions } from 'crypto';
import type { HighResolutionTime } from "perf_hooks";

function createAbortError(reject: true): Promise<never>;
function createAbortError(): Error;
function hasBit(value: unknown, flags: number): boolean;
function ignoreFlag(value: unknown): boolean;
function cloneFlag(value: unknown): boolean;
function usingFlag(value: unknown): boolean;
function watchFlag(value: unknown): boolean;
function modifiedFlag(value: unknown): boolean;
function processFlag(value: unknown): boolean;
function mainFlag(value: unknown): boolean;
function existsFlag(value: unknown): boolean;
function getLogCurrent(): LogArguments | null;
function setLogCurrent(value: LogArguments): void;
function setTempDir(value: string): boolean;
function getTempDir(): string;
function isArray(value: unknown): value is unknown[];
function isObject(value: unknown): value is object;
function isPlainObject(value: unknown): value is Record<string | number | symbol,
↳ unknown>;
function isString(value: unknown): value is string;
function isEmpty(value: unknown): boolean;
function asFunction(value: unknown, sync?: boolean): ((...args: unknown[]) => Promise
↳ <unknown> | unknown) | null;
function parseTime(value: number | string, start?: number): number;
function parseExpires(value: number | string, start?: number): number;
function formatTime(value: number, char: string): string;
function formatTime(value: number, elapsed?: boolean, char?: string): string;
function convertTime(value: number | string): number;
function convertTime(value: HighResolutionTime, format: true): string;
function convertTime(value: HighResolutionTime, format?: boolean): number;
function hasGlob(value: string): boolean;
function escapePattern(value: unknown, lookBehind?: boolean): string;
function renameExt(value: string, ext: string, when?: string): string;
function formatSize(value: string): number;
function formatSize(value: number, options?: BytesOptions): string;
function alignSize(value: unknown, kb?: number, factor?: number): number;
function cascadeObject(data: object, query: string, fallback?: unknown): unknown;
function cloneObject(data: unknown, deep: boolean): unknown;
function cloneObject(data: unknown, deepIgnore: WeakSet<object>): unknown;
function cloneObject(data: unknown, options?: CloneObjectOptions<unknown>): unknown;
function coerceObject(data: unknown, cache: boolean): unknown;
function coerceObject(data: unknown, parseString?: (...args: [string]) => unknown, cache?

```

(continues on next page)

(continued from previous page)

```

↳: boolean): unknown;
function getEncoding(value: unknown, fallback?: BufferEncoding): BufferEncoding;
function encryptUTF8(algorithm: CipherGCMTypes, key: BinaryLike, iv: BinaryLike, data:↳
↳string, encoding?: Encoding): string | undefined;
function decryptUTF8(algorithm: CipherGCMTypes, key: BinaryLike, iv: BinaryLike, data:↳
↳string, encoding?: Encoding): string | undefined;
function generateUUID(options?: RandomUUIDOptions): string;
function incrementUUID(restart?: boolean): string;
function validateUUID(value: unknown): boolean;
function randomString(format: string, dictionary?: string): string;
function errorValue(value: string, hint?: string): Error;
function errorMessage(title: number | string, value: string, hint?: string): Error;
function purgeMemory(percent?: number): number;

interface LOG_TYPE {
    UNKNOWN: 0;
    SYSTEM: 1;
    NODE: 2;
    PROCESS: 4;
    COMPRESS: 8;
    WATCH: 16;
    FILE: 32;
    CLOUD: 64;
    TIME_ELAPSED: 128;
    TIME_PROCESS: 256;
    FAIL: 512;
    HTTP: 1024;
    IMAGE: 2048;
    EXEC: 4096;
    PERMISSION: 8192;
    TIMEOUT: 16384;
    STDOUT: 32768;
    DB: 65536;
}

interface STATUS_TYPE {
    UNKNOWN: 0;
    FATAL: 1;
    ERROR: 2;
    WARN: 3;
    INFO: 4;
    DEBUG: 5;
    ASSERT: 6;
    TRACE: 7;
}

interface ASSET_FLAG {
    NONE: 0;
    IGNORE: 1;
    CLONE: 2;
    USING: 4;
    WATCH: 8;
}

```

(continues on next page)

(continued from previous page)

```
    MODIFIED: 16;
    PROCESS: 32;
    MAIN: 64;
    EXISTS: 128;
}

interface FILE_TYPE {
    UNKNOWN: 0;
    ASSET: 1;
    TRANSFORM: 2;
    COMPRESSED: 4;
    SOURCEMAP: 8;
    TORRENT: 16;
}

interface ACTION_FLAG {
    NONE: 0;
    IGNORE: 1;
}

interface ERR_CODE {
    MODULE_NOT_FOUND: "MODULE_NOT_FOUND";
}

interface DOWNLOAD_TYPE {
    HTTP: 0;
    DISK: 1;
    CACHE: 2;
}

interface FETCH_TYPE {
    UNKNOWN: 0;
    HTTP: 1;
    TORRENT: 2;
    FTP: 3;
    UNIX_SOCKET: 4;
}

interface DB_TYPE {
    SQL: 1;
    NOSQL: 2;
    DOCUMENT: 4;
    KEYVALUE: 8;
}

interface DB_TRANSACTION {
    ACTIVE: 1;
    PARTIAL: 2;
    COMMIT: 4;
    TERMINATE: 8;
    ABORT: 16;
    FAIL: 32;
}
```

(continues on next page)

(continued from previous page)

```

    AUTH: 64;
    CACHE: 128;
}

interface TRANSFER_TYPE {
    DISK: 1;
    STREAM: 2;
    CHUNK: 4;
}

interface WATCH_EVENT {
    MODIFIED: "modified";
    BROADCAST: "broadcast";
    CLOSE: "close";
    ERROR: "error";
}

interface READDIR_SORT {
    FILE: number;
    DIRECTORY: number;
    DESCENDING: number;
}

interface THRESHOLD {
    FILEMANAGER_INTERVAL: number;
    WATCH_INTERVAL: number;
    WATCH_CHANGE: number;
}

const IMPORT_MAP: StringMap;

```

Deprecated since version 0.9.2:

- Method **generateUUID** is the same as *crypto.randomUUID*.

Removed in version 0.9.0:

- *type* `StringOfArray` was renamed *ArrayOf<string>*.
- *type* `BufferContent` was renamed *Bufferable*.
- *interface* `PoolConfig` in **db** was relocated to *settings*.
- *interface* `LoggerFormat` in **logger** was relocated to *settings*.
- *interface* `AddEventListenerOptions` in **dom** was relocated to *core*.

Added in version 0.8.4:

- Method **alignSize** was created.

8.11.2 References

- <https://www.unpkg.com/@e-mc/types/lib/logger.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/module.d.ts>
- <https://www.npmjs.com/package/@types/bytes>

8.12 @e-mc/watch

- `npm i @e-mc/watch`

8.12.1 Interface

Listing 26: View Source

```
import type { IFileManager, ModuleConstructor } from "../index";
import type { ExternalAsset } from "../asset";
import type { HostInitConfig, IClient, IPermission } from "../core";
import type { FinalizeResult, PostFinalizeCallback } from "../filemanager";
import type { WatchModule } from "../settings";
import type { IFileGroup, ModifiedPostFinalizeListener, SecureOptions } from "../watch";

import type * as ws from "ws";

interface IWatch extends IClient<IFileManager, WatchModule, ModifiedPostFinalizeListener>
↳ {
  connectTimeout: number;
  init(config?: HostInitConfig): this;
  start(assets: ExternalAsset[], permission?: IPermission | null): void;
  modified(watch: IFileGroup<ExternalAsset>): Promise<FinalizeResult | void>;
  configureServer(options: SecureOptions): boolean;
  setCA(value: string): boolean;
  setSSLKey(value: string): boolean;
  setSSLCert(value: string): boolean;
  hasSecureProtocol(): boolean;
  whenModified?(assets: ExternalAsset[], postFinalize: PostFinalizeCallback): ↳
↳ IFileManager;
  whenModified?(assets: ExternalAsset[], sanitize?: boolean, postFinalize?: ↳
↳ PostFinalizeCallback): IFileManager;
  set assets(value: ExternalAsset[]);
  get assets(): ExternalAsset[];
  set interval(value);
  get interval(): number;
  set port(value);
  get port(): number;
  set securePort(value);
  get securePort(): number;
}

interface WatchConstructor extends ModuleConstructor {
```

(continues on next page)

(continued from previous page)

```

    createServer(port: number, active: boolean): ws.Server | null;
    createServer(port: number, secure?: SecureOptions | null, active?: boolean): ws.
↪Server | null;
    shutdown(): void;
    setTimeout(value: number | string): void;
    checkTimeout(client: ws): boolean;
    readonly prototype: IWatch;
    new(module?: WatchModule): IWatch;
}

```

Removed in version 0.9.0:

- Constructor `new(interval, port, securePort, extensions)` did not conform with `Module.init()`.

8.12.2 Settings

Listing 27: View JSON

```

import type { PermittedDirectories } from "./core";

import type { SecureVersion } from "tls";

interface WatchModule {
    // handler: "@e-mc/watch";
    extensions?: string[];
    timeout?: number | string;
    interval?: number | string;
    port?: number;
    secure?: {
        port?: number;
        ca?: string;
        key?: string;
        cert?: string;
        passphrase?: string;
        version?: SecureVersion;
    };
    settings?: {
        broadcast_id?: string | string[];
        users?: Record<string, Record<string, unknown>>;
    };
    permission?: PermittedDirectories;
}

```

Example usage

```
const Watch = require("@e-mc/watch");

const instance = new Watch({ interval: 100, port: 8080 });
instance.init();

instance.whenModified = (assets) => {
  assets.forEach(item => console.log(item.uri));
};

const assets = [
  { localUri: "/path/workspace/output/image1.png", uri: "http://hostname/path/document1.
  ↪png", watch: true },
  { localUri: "/path/workspace/output/image2.png", uri: "http://hostname/path/document2.
  ↪png", watch: true }
];

instance.start(assets, { disk_read: ["/path/workspace/output/**"] });
```

8.12.3 References

- <https://www.unpkg.com/@e-mc/types/lib/asset.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/core.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/filemanager.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/settings.d.ts>
- <https://www.unpkg.com/@e-mc/types/lib/watch.d.ts>
- <https://www.npmjs.com/package/@types/node>
- <https://www.npmjs.com/package/@types/ws>

8.13 ESM imports

The default convention for all packages was removed in **E-mc 0.9**. It is auto-generated by the TSC (TypeScript) compiler and is not necessary for out-of-source tree usage.

Listing 28: 0.8.0

```
import Module from "@e-mc/module"; // OK
const Module = require("@e-mc/module"); // OK

let Module;
import("@e-mc/module").then(res => Module = res.default); // OK
import("@e-mc/module").then(res => Module = res); // OK

Module.default.isPath("/path/file"); // OK
Module.isPath("/path/file"); // OK
```

Listing 29: 0.9.0

```
import Module from "@e-mc/module"; // OK
const Module = require("@e-mc/module"); // OK

let Module;
import("@e-mc/module").then(res => Module = res.default); // FAIL
import("@e-mc/module").then(res => Module = res); // OK

Module.default.isPath("/path/file"); // FAIL
Module.isPath("/path/file"); // OK
```

Besides static methods there is an additional utility library within these modules:

- @e-mc/cloud/util
- @e-mc/db/util
- @e-mc/document/util
- @e-mc/request/util

REFERENCES

9.1 squared

<https://unpkg.com/squared/types/type.d.ts>

PlainObject

StringMap

<https://unpkg.com/squared/types/base/resource.d.ts>

URLData

<https://unpkg.com/squared/types/base/file.d.ts>

BroadcastResponse

DbDataSource

FileAsset

LogStatus

9.2 E-mc

<https://unpkg.com/@e-mc/types/lib/index.d.ts>

IFileManager

IHost

Image

Module

<https://unpkg.com/@e-mc/types/lib/core.d.ts>

PermittedDirectories

<https://unpkg.com/@e-mc/types/lib/document.d.ts>

ChunkData

ITransformSeries

RawSourceMap

SourceInput

SourceMap

TransformOutput

<https://unpkg.com/@e-mc/types/lib/db.d.ts>

CascadeAction

ServerAuth

<https://unpkg.com/@e-mc/types/lib/cloud.d.ts>

CloudDatabase

CloudService

CloudStorage

<https://unpkg.com/@e-mc/types/lib/node.d.ts>

Settings

<https://unpkg.com/@e-mc/types/lib/http.d.ts>

AuthValue

SecureConfig

<https://unpkg.com/@e-mc/types/lib/asset.d.ts>

ExternalAsset

9.3 NodeJS

<https://nodejs.org/api/modules.html>

NodeRequire

<https://nodejs.org/api/buffer.html>

BufferEncoding

<https://nodejs.org/api/crypto.html>

BinaryLike

CipherGCMTypes

<https://nodejs.org/api/tls.html>

SecureVersion

<https://nodejs.org/api/url.html>

URL

VERSIONS

Date	Docs	E-mc	Pi-r
04-29-24	0.3.0	0.9.0	0.7.0
04-02-24	0.2.2	0.8.7	0.6.6
03-06-24	0.2.1	0.8.6	0.6.5
02-19-24	0.2.0	0.8.4	0.6.4
01-31-24	0.1.1	0.8.3	0.6.3
01-26-24	0.1.0	0.8.2	0.6.2

SQUARED-FUNCTIONS

11.1 squared-express

Listing 1: squared.json

```
{
  "node": {
    "compat": {
      "v4": true
    }
  }
}
```

--compat-v4

Override **node.compat.v4** and enable compatibility with *squared-functions*.

--no-compat-v4

Override **node.compat.v4** and disable compatibility with *squared-functions*.

Attention: It will be disabled as of *squared 5.2.0* in *squared.json*.

11.1.1 Settings

Deprecated settings from *squared-functions* were removed. Misplaced properties that are undetected will use the default **E-mc** value.

--migrations

Will be required as of *squared-express 3.2.0* for those who have not made the suggested conversions.¹

--no-migrations

Ignore unsupported and possibly incorrect values from previous installations.²

¹ squared-express 3.2 + sqd-serve 0.14 (alternative --compat-v4)

² squared-express 3.1 + sqd-serve 0.13

11.2 @e-mc/compat-v4

When not using `squared-express` you will have to include it in the main process before using `require` with packages that use or inherit from *squared-functions*.

Listing 2: package.json

```
{
  "dependencies": {
    "@e-mc/compat-v4": "^0.9.0"
  }
}
```

Attention: It will not be installed by default³ as of *squared 5.2.0* in *package.json*.

11.2.1 sqd-serve

The module is no longer directly loadable as of **0.14.0**. Migration for settings are still available through **node.compat.v4** or command line options.

Examples use **squared 5** and **chrome** as the reference framework. These concepts can be used with any NodeJS 16+ application.

Note: Using `squared` or `squared-express` is not required.

³ `npm i @e-mc/compat-v4`

NODEJS 14 LTS

- 0.8.10
- 0.7.6
- 0.6.3
- 0.5.6

LICENSE

BSD 3-Clause

Symbols

- `--compat-v4`
 - command line option, 189
- `--migrations`
 - command line option, 189
- `--no-compat-v4`
 - command line option, 189
- `--no-migrations`
 - command line option, 189

C

- command line option
 - `--compat-v4`, 189
 - `--migrations`, 189
 - `--no-compat-v4`, 189
 - `--no-migrations`, 189