

# @push.rocks/smartj son

A library for handling typed JSON data, providing functionalities for parsing, stringifying, and working with JSON objects, including support for encoding and decoding buffers.

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# readme.md for @push.rocks/smartjson

## ☐ Typed JSON handling for modern Node.js and TypeScript applications

A powerful library for working with JSON in TypeScript, providing type-safe serialization, advanced buffer handling, deep object comparison, and support for complex class instances. Perfect for applications that need reliable JSON manipulation with full TypeScript support.

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## Installation

```
# Using npm
npm install @push.rocks/smartjson --save

# Using yarn
yarn add @push.rocks/smartjson

# Using pnpm (recommended)
pnpm add @push.rocks/smartjson
```

## Features

- ☐ **Type-Safe JSON Operations** - Full TypeScript support with proper typing
- ☐ **Class Instance Serialization** - Fold and unfold class instances to/from JSON
- ☐ **Buffer & Binary Support** - Seamless handling of Buffers and Typed Arrays
- ☐ **JSON Lines Support** - Parse, stringify and compare JSONL data streams
- ☐ **Pretty Printing** - Beautiful formatted JSON output
- ✂ **Stable Stringification** - Consistent key ordering for reliable comparisons
- 🔄 **Circular Reference Handling** - Safe one-way stringify for objects with cycles
- ☐ **Deep Equality Checks** - Compare complex objects and JSON structures
- ☐ **Base64 Encoding** - Built-in base64 JSON encoding/decoding

## Quick Start

```
import * as smartjson from '@push.rocks/smartjson';

// Parse JSON with automatic buffer handling
const parsed = smartjson.parse('{"name":"example","data":{"type":"Buffer","data":[1,2,3]}}');

// Stringify with stable key ordering
const json = smartjson.stringify({ z: 1, a: 2, m: 3 });
// Result: '{"a":2,"m":3,"z":1}'

// Pretty print for human readability
const pretty = smartjson.stringifyPretty({ hello: 'world', count: 42 });
// Result:
// {
//   "hello": "world",
//   "count": 42
// }
```

## Core Functions

### JSON Parsing and Stringification

```
// Standard parsing with automatic Buffer detection
const obj = smartjson.parse('{"hello":"world"}');
```

```
// Stable stringification (consistent key ordering)
const jsonStr = smartjson.stringify({ name: 'test', id: 1 });

// Pretty printing for debugging
const prettyJson = smartjson.stringifyPretty({
  nested: {
    data: 'value'
  }
});
```

## Safe One-Way Stringification (New in v5.1.0)

Handle circular references and unserializable values safely for hashing and comparisons:

```
// Create objects with circular references
const objA = { name: 'A' };
const objB = { name: 'B', ref: objA };
objA['ref'] = objB; // Circular reference!

// Normal stringify would throw, but stableOneWayStringify handles it
const safeJson = smartjson.stableOneWayStringify(objA);
// Circular references are replaced with "__cycle__"

// Perfect for object hashing
const hash1 = crypto.createHash('sha256')
  .update(smartjson.stableOneWayStringify(complexObject))
  .digest('hex');

// Handles unserializable values gracefully
const objWithGetter = {
  normal: 'value',
  get throwing() { throw new Error('Cannot serialize!'); }
};
const safe = smartjson.stableOneWayStringify(objWithGetter);
// Throwing getters are replaced with "__unserializable__"

// Custom key ordering for consistent hashes
```

```
const ordered = smartjson.stableOneWayStringify(  
  { z: 1, a: 2 },  
  ['a', 'z'] // Specify key order  
);
```

## Base64 JSON Encoding

Encode JSON data as base64 for safe transmission:

```
const myData = {  
  message: 'Hello World',  
  timestamp: Date.now()  
};  
  
// Encode to base64  
const encoded = smartjson.stringifyBase64(myData);  
console.log(encoded); // Base64 string  
  
// Decode back to object  
const decoded = smartjson.parseBase64(encoded);  
console.log(decoded); // Original object
```

## JSON Lines (JSONL) Support

Perfect for streaming data and log processing:

```
// Parse JSON Lines format  
const jsonLines = `{"event":"start","time":1234}  
{ "event": "data", "value": 42 }  
{ "event": "end", "time": 5678 }`;  
  
const events = smartjson.parseJsonL(jsonLines);  
// Result: Array of parsed objects  
  
// Produce JSONL from objects  
const jsonlOut = smartjson.stringifyJsonL([  
  { event: 'start', time: 1234 },  
  { event: 'data', value: 42 },  
]);
```

```
{ event: 'end', time: 5678 }
]);

// Compare JSON Lines data
const jsonL1 = `{"id":1}\n{"id":2}`;
const jsonL2 = `{"id":1}\n{"id":2}`;
const isEqual = smartjson.deepEqualJsonLStrings(jsonL1, jsonL2); // true
```

# Advanced Class Serialization

## Creating Serializable Classes

Transform class instances to JSON and back while preserving type safety:

```
import { Smartjson, foldDec } from '@push.rocks/smartjson';

class User extends Smartjson {
  @foldDec() accessor username: string;
  @foldDec() accessor email: string;
  @foldDec() accessor settings: UserSettings;

  // Properties without @foldDec won't be serialized
  private internalId: string;

  constructor(username: string, email: string) {
    super();
    this.username = username;
    this.email = email;
    this.settings = new UserSettings();
    this.internalId = Math.random().toString();
  }
}

class UserSettings extends Smartjson {
  @foldDec() accessor theme: 'light' | 'dark' = 'light';
  @foldDec() accessor notifications: boolean = true;
}
```

```

// Create and serialize
const user = new User('john_doe', 'john@example.com');
user.settings.theme = 'dark';

// Convert to JSON
const jsonString = user.foldToJson();
console.log(jsonString);
//
{"username":"john_doe","email":"john@example.com","settings":{"theme":"dark","notifications":true}}

// Restore from JSON with correct typing
const restoredUser = User.enfoldFromJson(jsonString);
console.log(restoredUser instanceof User); // true
console.log(restoredUser.settings instanceof UserSettings); // true

```

## Working with Nested Objects

```

class Company extends Smartjson {
  @foldDec() accessor name: string;
  @foldDec() accessor employees: Employee[] = [];

  addEmployee(employee: Employee) {
    this.employees.push(employee);
  }
}

class Employee extends Smartjson {
  @foldDec() accessor name: string;
  @foldDec() accessor role: string;
  @foldDec() accessor salary: number;

  constructor(name: string, role: string, salary: number) {
    super();
    this.name = name;
    this.role = role;
    this.salary = salary;
  }
}

```

```
    }  
  }  
  
  const company = new Company();  
  company.name = 'TechCorp';  
  company.addEmployee(new Employee('Alice', 'Developer', 100000));  
  company.addEmployee(new Employee('Bob', 'Designer', 90000));  
  
  // Serialize entire object graph  
  const json = company.foldToJson();  
  
  // Deserialize with all nested objects properly instantiated  
  const restored = Company.enfoldFromJson(json);
```

# Buffer and Binary Data Handling

SmartJson seamlessly handles binary data in JSON:

```
// Automatic Buffer handling  
const dataWithBuffer = {  
  name: 'BinaryData',  
  buffer: Buffer.from('Hello World'),  
  typedArray: new Uint8Array([1, 2, 3, 4, 5])  
};  
  
// Stringify (buffers are automatically encoded)  
const jsonStr = smartjson.stringify(dataWithBuffer);  
  
// Parse (buffers are automatically restored)  
const restored = smartjson.parse(jsonStr);  
console.log(restored.buffer); // Buffer  
console.log(restored.typedArray); // Uint8Array
```

# Deep Comparison

Compare complex objects with automatic normalization:

```
// Deep object comparison
const obj1 = {
  nested: {
    array: [1, 2, { deep: 'value' }],
    flag: true
  },
  name: 'test'
};

const obj2 = {
  name: 'test', // Different order
  nested: {
    flag: true, // Different order
    array: [1, 2, { deep: 'value' }]
  }
};

const isEqual = smartjson.deepEqualObjects(obj1, obj2); // true
```

# Real-World Examples

## API Response Caching

```
class CachedAPIResponse extends Smartjson {
  @foldDec() accessor data: any;
  @foldDec() accessor timestamp: number;
  @foldDec() accessor endpoint: string;

  isExpired(maxAge: number = 3600000): boolean {
    return Date.now() - this.timestamp > maxAge;
  }

  static fromAPICall(endpoint: string, data: any): CachedAPIResponse {
    const response = new CachedAPIResponse();
    response.endpoint = endpoint;
    response.data = data;
  }
}
```

```

    response.timestamp = Date.now();
    return response;
  }
}

// Store API response
const apiData = await fetch('/api/users');
const cached = CachedAPIResponse.fromAPICall('/api/users', await apiData.json());
localStorage.setItem('cached_users', cached.foldToJson());

// Retrieve and check
const stored = localStorage.getItem('cached_users');
if (stored) {
  const cached = CachedAPIResponse.enfoldFromJson(stored);
  if (!cached.isExpired()) {
    return cached.data; // Use cached data
  }
}
}

```

## Configuration Management

```

class AppConfig extends Smartjson {
  @foldDec() accessor apiUrl: string;
  @foldDec() accessor features: Map<string, boolean> = new Map();
  @foldDec() accessor limits: {
    maxUploadSize: number;
    maxConcurrentRequests: number;
  };

  enableFeature(name: string) {
    this.features.set(name, true);
  }

  save() {
    fs.writeFileSync('config.json', this.foldToJson());
  }

  static load(): AppConfig {

```

```
const json = fs.readFileSync('config.json', 'utf-8');
return AppConfig.enfoldFromJson(json);
}
}
```

# API Reference

## Core Functions

- `parse(jsonString: string): any` - Parse JSON with automatic buffer handling
- `stringify(obj: any, simpleOrderArray?: string[], options?: Options): string` - Convert to JSON with stable ordering
- `stableOneWayStringify(obj: any, simpleOrderArray?: string[], options?: Options): string` - Safe stringify with circular reference handling (one-way, for hashing/comparison)
- `stringifyPretty(obj: any): string` - Pretty print JSON with 2-space indentation
- `stringifyBase64(obj: any): string` - Encode JSON as base64
- `parseBase64(base64String: string): any` - Decode base64 JSON
- `parseJsonL(jsonLinesString: string): any[]` - Parse JSON Lines format
- `stringifyJsonL(items: any[]): string` - Stringify array to JSON Lines
- `deepEqualObjects(obj1: any, obj2: any): boolean` - Deep comparison of objects
- `deepEqualJsonLStrings(jsonL1: string, jsonL2: string): boolean` - Compare JSON Lines strings

## Smartjson Class

- `Smartjson.enfoldFromObject<T>(obj: any): T` - Create instance from plain object
- `Smartjson.enfoldFromJson<T>(json: string): T` - Create instance from JSON string
- `instance.foldToObject(): any` - Convert instance to plain object
- `instance.foldToJson(): string` - Convert instance to JSON string

## Decorators

- `@foldDec()` - Mark class property for serialization (use with `accessor` keyword)

## Performance Tips

1. **Use stable stringification** for consistent hashing and comparison
2. **Enable pretty printing** only for debugging (it's slower)
3. **Cache base64 encodings** when repeatedly sending the same data
4. **Use JSON Lines** for streaming large datasets
5. **Use stableOneWayStringify** for objects with circular references (for hashing/caching)
6. **Prefer regular stringify** for round-trip serialization without cycles

# Migration Guide

If you're migrating from native JSON:

```
// Before
JSON.parse(jsonString);
JSON.stringify(object);

// After
smartjson.parse(jsonString); // Adds buffer support
smartjson.stringify(object); // Adds stable ordering & buffer support
```

# Browser Support

This library supports modern browsers and Node.js environments. For older browsers, ensure you have appropriate polyfills for `TextEncoder` and `TextDecoder`.

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# changelog.md for @push.rocks/smartjson

## 2025-12-10 - 6.0.0 - BREAKING CHANGE(Smartjson)

Require TC39 Stage 3 decorators for @foldDec (use accessor), switch foldDec to initializer-based implementation, improve buffer encode/decode handling, bump dependencies and update docs/tests.

- foldDec now implements TC39 Stage 3 accessor decorators and must be used with the 'accessor' keyword (e.g. '@foldDec() accessor prop: T'). The decorator registers saveable properties via context.addInitializer so properties are tracked per-instance.
- Buffer handling rewritten: replacer/reviver handle Uint8Array and Buffer cross-platform; EncodedBuffer.data now uses a 'base64:' prefix and reviver returns a Uint8Array. This changes the serialized representation of buffers.
- tsconfig updated to remove experimentalDecorators and useDefineForClassFields overrides — project now targets modern TypeScript decorator support (ensure your toolchain supports Stage 3 decorators).
- Documentation (readme and hints) and tests updated to reflect accessor-based decorators and new buffer handling.
- Dependencies bumped: @push.rocks/smartenv -> ^6.0.0, dev deps @git.zone/tsbuild, @git.zone/tsrun, @git.zone/tstest upgraded, and @types/node -> ^24.0.0.
- Removed pnpm-workspace.yaml onlyBuiltDependencies entries.

## 2025-09-12 - 5.2.0 - feat(smartjson)

Implement stableOneWayStringify: deterministic, cycle-safe JSON for hashing/comparisons; update docs and tests

- Implement `stableOneWayStringify` in `ts/index.ts`: produces deterministic JSON, encodes buffers, replaces circular references with "**cycle**" and marks unserializable values as "**unserializable**".
- Update README: add documentation and examples for `stableOneWayStringify`, clarify JSONL wording, and update performance/migration notes.
- Add unit test to verify `stableOneWayStringify` handles circular references without throwing.
- Add `.claude/settings.local.json` (local settings/config) as part of the change set.

## 2025-09-12 - 5.1.0 - feat(smartjson)

Add JSONL stringify and ordering comparator; fix empty buffer handling; refactor Smartjson folding/enfolding

- Export `stringifyJsonL(items: any[])` and add README documentation for JSONL stringification
- `stringify(obj, simpleOrderArray)` now derives a stable-json comparator from `simpleOrderArray` when no custom `cmp` is provided, ensuring predictable key ordering
- Fix buffer handling: empty `Uint8Array` values are preserved (no longer serialized to an empty string) and encoding/decoding logic improved
- Refactor `Smartjson.enfoldFromObject` to safely use `saveableProperties` and avoid repeated property access
- Simplify `Smartjson.foldToObject` to delegate to an internal `foldToObjectInternal` with cycle detection and correct nested instance handling
- Add unit tests for empty buffers, JSONL parse/stringify, `deepEqualJsonLStrings`, and `simpleOrderArray` comparator behavior

## 2025-09-12 - 5.0.21 - fix(Smartjson)

Cross-platform buffer/base64 handling, safer folding with cycle detection, parsing fixes, docs and dependency updates

- `bufferhandling`: prefer Node Buffer for base64 encode/decode when available and fall back to browser APIs for cross-platform support

- parsejsonL: more robust parsing of JSON Lines (trim lines and use smartjson.parse to restore buffers/typed arrays)
- parseBase64: use smartstring.base64.decodeUri or decode fallback before parsing, then parse result via smartjson.parse
- Smartjson class: add TypeScript generics to enfold methods, introduce foldToObjectInternal and robust cycle detection using Set, properly handle arrays and deep-clone values
- Tests: updated tap import path to @git.zone/tstest/tapbundle
- package.json: bumped several devDependencies and dependency versions and added packageManager pin
- Documentation: expanded README with examples, API reference and usage guidance
- Repo config: added pnpm-workspace.yaml and .claude/settings.local.json

## 2024-05-29 - 5.0.20 - docs

Update package description.

- Update package description text.

## 2024-05-27 - 5.0.19 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2024-04-17 - 5.0.18 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2024-04-17 - 5.0.17 - core

Core fixes.

- Miscellaneous core updates and fixes.

# 2024-04-17 - 5.0.16 - build/core

Build/config updates and core fixes.

- Updated tsconfig configuration (2024-04-14).
- Updated npmextra.json githost entries (multiple updates in early April).
- Miscellaneous core updates and fixes.

# 2024-03-19 - 5.0.15 - core

Core fixes.

- Miscellaneous core updates and fixes.

# 2024-03-19 - 5.0.14 - core

Core fixes.

- Miscellaneous core updates and fixes.

# 2024-03-03 - 5.0.13 - core

Core fixes.

- Miscellaneous core updates and fixes.

# 2024-03-03 - 5.0.12 - core

Core fixes.

- Miscellaneous core updates and fixes.

# 2024-03-03 - 5.0.11 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2024-02-25 - 5.0.10 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2023-08-24 - 5.0.9 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2023-08-19 - 5.0.8 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2023-08-19 - 5.0.7 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2023-07-10 - 5.0.6 - infra/core

Organization and core updates.

- Switched to new organization scheme.
- Miscellaneous core updates and fixes.

# 2023-06-03 - 5.0.5 - core

Core fixes.

- Miscellaneous core updates and fixes.

# 2022-10-26 - 5.0.4 - core

Core fixes.

- Miscellaneous core updates and fixes.

# 2022-10-26 - 5.0.3 - core

Core fixes.

- Miscellaneous core updates and fixes.

# 2022-10-26 - 5.0.2 - core

Core fixes.

- Miscellaneous core updates and fixes.

# 2022-09-13 - 5.0.1 - core

Core fixes.

- Miscellaneous core updates and fixes.

# 2022-06-26 - 5.0.0 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2022-06-09 - 4.0.7 - core (BREAKING CHANGE)

Breaking change in core.

- BREAKING CHANGE: core-related update (see code/compat notes).
- Miscellaneous core updates.

## 2022-06-09 - 4.0.6 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2020-10-05 - 4.0.4 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2020-10-05 - 4.0.3 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2020-10-05 - 4.0.2 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2020-10-05 - 4.0.1 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2020-10-05 - 4.0.0 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2020-10-05 - 3.0.12 - core (BREAKING CHANGE)

Breaking change in core.

- BREAKING CHANGE: core-related update (see migration notes).
- Miscellaneous core updates.

## 2020-10-03 - 3.0.11 - core

Core fixes.

- Miscellaneous core updates and fixes.

## 2020-10-03 - 3.0.10 - core

Core fixes.

- Miscellaneous core updates and fixes.

# 2019-02-14 - 3.0.0 - security

Security-related update.

- Added snyk policy for security scanning.

# 2019-02-14 - 2.0.2 - core (BREAKING CHANGE)

Breaking change in core API.

- BREAKING CHANGE: renamed Folable to Smartjson and added deterministic stringify.
- Update consumers accordingly.

# 2018-09-05 - 2.0.1 - core

Core fixes.

- Miscellaneous core updates and fixes.

# 2018-07-23 - 1.0.1 - scope (BREAKING CHANGE)

Scope change.

- BREAKING CHANGE: changed package scope.
- See migration notes for scope changes.

# 2017-02-27 - 1.0.0 - docs/init

Initial release.

- Added README.
- Initial project files and setup.

# 2018-07-23 — 2019-12-15 - 2.0.0, 3.0.1, 3.0.9 - version-only releases

Version-only tags / non-descriptive releases.

- These releases are recorded as version bumps without additional changelog details.
- Affected tags: 2.0.0, 3.0.1, 3.0.9.