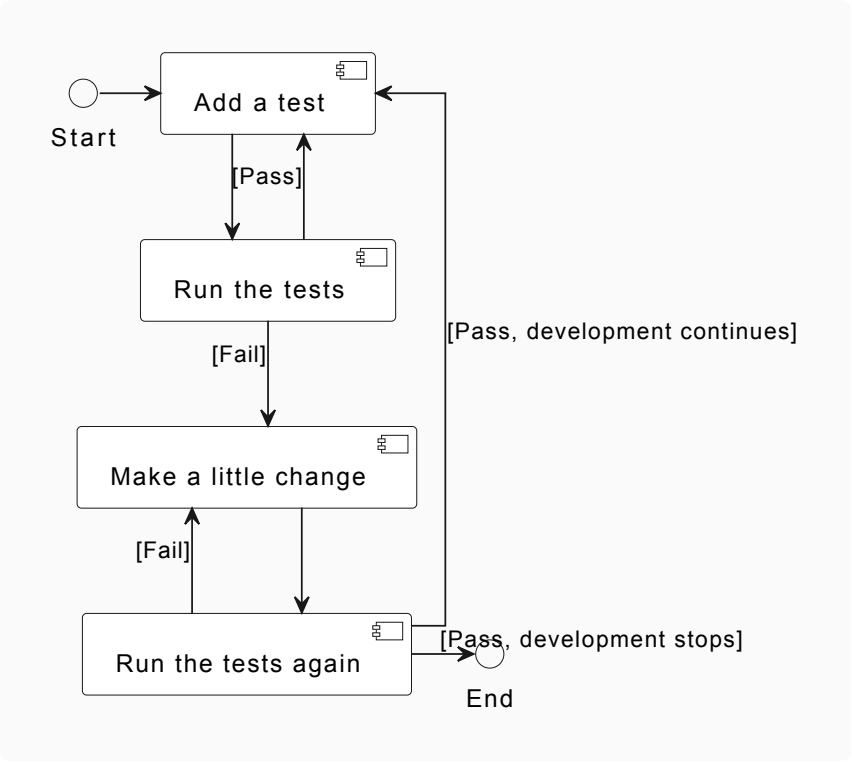
Type-Extensible Object Notation: JSON with Syntax for Types

Test-Driven Development

Testing has implications not only for the approach to implementation, but also the structure of the code itself and the overall practices surrounding projects. As each feature needs to be developed on a foundation of demonstrable necessity, the process must be divided into small enough steps for testing to be possible. The testing of a smaller component in a large codebase is referred to as `unit tests`, as each component becomes a testable `unit`.

- Execution time should be short, resulting in fast testing.
- Tests should be executed in isolation from each other, resulting in unordered tests.
- Use production data when applicable, and ensure data is readable and understandable.
- Each test should represent a component of a larger overall goal with the project.



A recursive test-driven development cycle

Unit and Acceptance Testing

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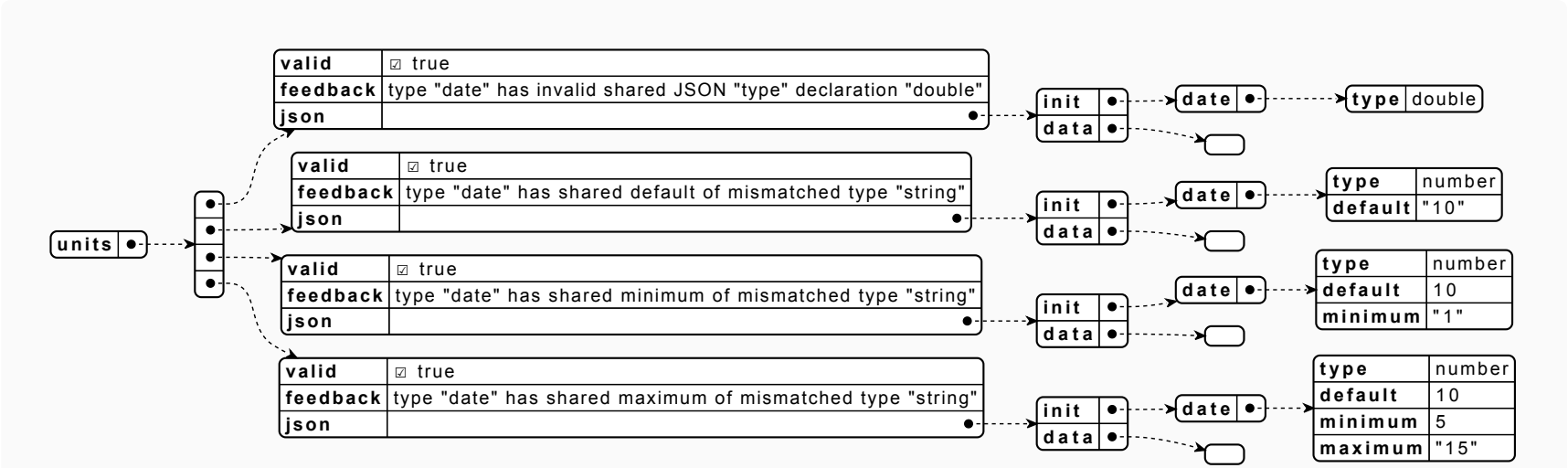
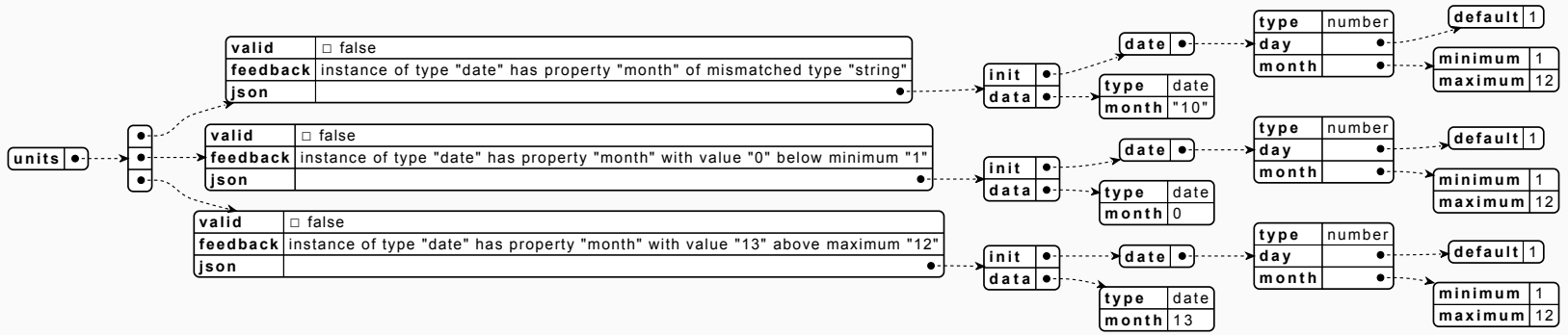


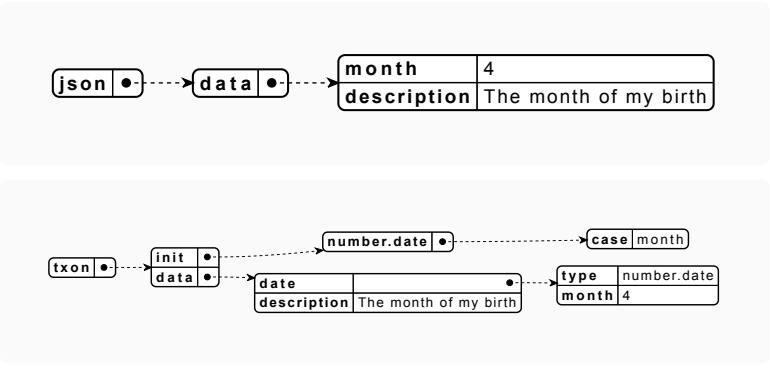


Unit tests for type declarations (top) and type instances (bottom)

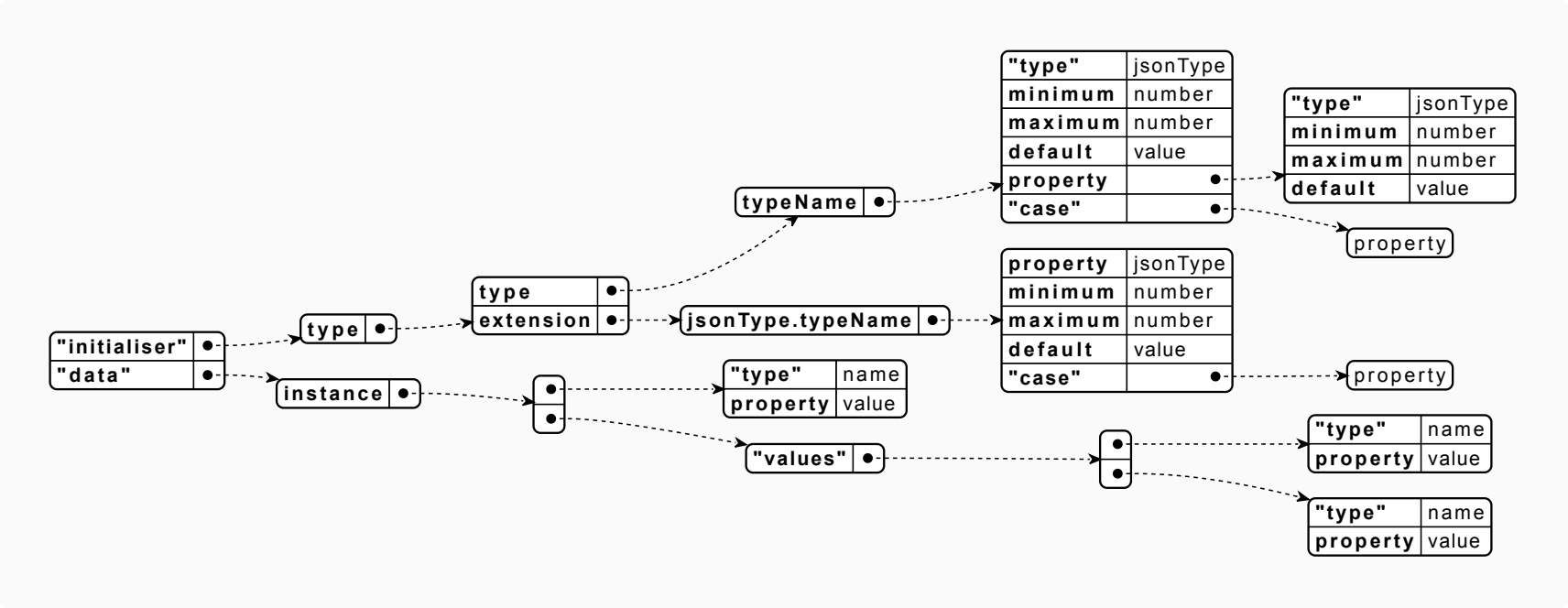
Type Semantics

This project contributes to existing implementations of the JSON specification by proposing a grammar for explicit and extensible typing of values. This proposal is phrased as the `Type-Extensibe Object Notation` (TXON) which is a format that conforms completely to the JSON specification, and as such it maintains full compatibility with existing JSON encoders and decoders. The TXON format is paired with the `TXON.js` library written in JavaScript, to validate the functional implementation and its use in a data structure, by checking conformance to its embedded type system.

A TXON data structure must contain an "init" and "data" property to be validated, but this is not expected to cause issue as JSON structures typically branch from a "data" property at the root node. As such the format is extensibly adding information on types, while maintaining as much of the original structure as possible.



Comparison of a TXON data structure and JSON data structure.


"initialiser"
"data"
type
instance
type
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typeName
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"values"
"type" jsonType
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maximum number
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"case"
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Relational Type

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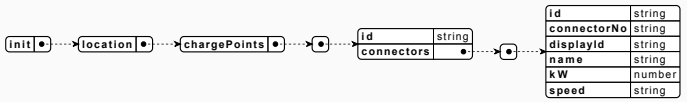
```
{
  "init": {
    "location": {
      "chargePoints": [{
        "id": "string",
        "connectors": [{
          "id": "string",
          "connectorNo": "string",
          "displayId": "string",
          "name": "string",
          "kW": "number",
          "speed": "string"
        }]
      }]
    }
  }
}
```



Regular Expression (RegEx)

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Optional Type

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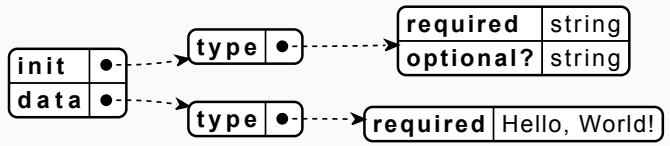
```
{
  "init": {
    "type": {
      "required": "string", "optional?": "string"
    }
  },
  "data": {
    "type": {
      "required": "Hello, World!"
    }
  }
}
```



Enumerated Type

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```
{
  "init": {
    "date": {
      "month": {
        "type": "string",
        "case": [
          "january", "february", "march"
        ]
      }
    }
  },
  "data": {
    "date": {
      "month": "january"
    }
  }
}
```