Progress report in Pen programming language

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Agenda

- Progress report
  - Built-in map type
  - JSON package
- Next plans

Progress report

Built-in map type

Pull requests

- #822 Map type
  - More than 6000 lines... orz
- #847 Comparable map type

Built-in map type (continued)

Functionalities

- Hash Array Mapped Trie
  - Implementation migrated from a `Core` package to a `Prelude` package
- Deterministic iteration
  - Multi-layer HAMT for hash collision resolution
- Key types need to be *comparable*.
  - `Eq` / `Hash` trait equivalents in Rust are implemented automatically.
- Map types are comparable as long as they do not contain any types not comparable.

Built-in map type (continued)

Examples

Types

```
{string: number} # String-to-number map
{[string]: number} # Lists can be keys!
{{string: number}: number} # Maps can be keys!
```

Built-in map type (continued)

Examples

Expressions

```
{string: number} # Empty map
{string: number "foo": 1, "bar": 2} # With entries
{string: number ...xs, "foo": 1} # Insertion
{string: number ...xs, "foo"} # Deletion
{string: number ...xs, ...ys} # Merging

# Indexing
if x = xs["foo"] {
  x
} else {
  error("key not found")
}
```

JSON package

- Pull request: #851
  - Work in progress
- Parsing/formatting
- Parsing is almost done other than the parts we need map types.
  - Handwritten LL(1) parser
  - No lexer for now

Next plans

- Upgrade to LLVM 14
  - The final RC is released last week.
  - Hopefully, next week?
- Additional map type features
  - List comprehension integration
  - Map comprehension (?)

Summary

- Progress
  - Built-in map type
  - JSON package
- Future plans
  - LLVM 14
  - More language features for map types