Progress report in Pen programming language

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Agenda

- Progress report
  - String concatenation
  - Debug function
- Next plans

Progress report

String concatenation

- Pen now has a string concatenation operator (`+`.)
- Multiple string concatenations are batched into one.

```
concatenateStrings = \(ss [string]) string {
  if [s, ...ss] = ss {
    s() + concatenateStrings(ss)
  } else {
    ""
  }
}
```

Debug function

- `debug` built-in function pretty-prints values of any types.
  - `\(any) none`
- Work is still in progress.
  - Primitive, record, and union types are done.

```
foo = \() none {
  xs = [number 1, 2, 3]

  debug(xs)
}
```

Output:

```
[number 1, 2, 3]
```

Type information

- Pen compiles AST -> HIR -> MIR -> F-- -> LLVM IR -> assembly.
- Pen previously had no HIR-level type information.
  - But only at the MIR level.
- We need to inject custom type information for reflection from HIR to MIR.
  - e.g. `debug` function

Type information

Internal representation

Variants:

offset (words)	data
0	pointer to type information
1	payload

Type information

Internal representation

Type information:

offset (words)	data	type
0	Clone function	(payload) -> payload
1	Drop function	(payload) -> ()
2	Synchronize function	(payload) -> ()
3	Custom function	() -> something

Next plan

- Bug fixes on macOS
- Refactoring...

Summary

- Progress
  - String concatenation
  - Debug function
- Next plans