Final Exam Review: Interpreters

CS 350

Dr. Joseph Eremondi

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Interpreters

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- Lazy evaluation

Syntax and the Language Pipeline

Life of a program

- The Language Pipeline:

Source code	parsing ⟶	Abstract syntax tree	*translation* ⟶	Core Syntax	*evaluation* ⟶	Result
text file	lexing / tokenizing first	data structure	desugaring / compilation	simpler AST / machine code	interpreter, execute on CPU	value, side effects

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    - e.g. We can't use Plait `+` on an `Expr`, but once we apply `interp` and get a `Number` we can

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    - Ignoring bound occurrences gives us *shadowing*

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    - This is how we say “run the body”

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  cout >> "hello";
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  - No equivalent in a purely functional language

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```
if (true){ // make the scope explicit
  int x = xExpr;
  body;
}
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- Whenever we check to see if a value is a particular kind of value, this is a *dynamic type check*

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- Performance:
  - Instead of traversing the entire body of the function, just push a binding onto the front of a list

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  - Add a new binding (e.g. add a new value for a given symbol)
    - Like a low-tech hashtable/dictionary/key-value store

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  - Sequence of states we pass along determines the execution order
- We can now view programs as functions from the current environment *and the current state of memory* to values *and states of memory*

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- Works as long as all recursive uses of the variable are in the body of a lambda
  - Closures don't evaluate their bodies until called

Alternate Models of Execution

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