

Lecture 23

Final lesson(s) from CS241

CS 241: Foundations of Sequential Programs
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Mysteries Solved

There should be no mysteries about how programs are compiled and run.

Computer Languages

- **Python**: What if everything was a dict?
- **Java**: What if everything was an object?
- **JavaScript**: What if everything was a dict *and* an object?
- **C**: What if everything was a pointer?
- **APL**: What if everything was an array?
- **Tcl**: What if everything was a string?
- **Prolog**: What if everything was a term?
- **LISP**: What if everything was a pair?
- **Scheme**: What if everything was a function?
- **Haskell**: What if everything was a monad?
- **Assembly**: What if everything was a register?
- **Coq**: What if everything was a type/proposition?
- **COBOL**: WHAT IF EVERYTHING WAS UPPERCASE?
- **C#**: What if everything was like Java, but different?
- **Ruby**: What if everything was monkey patched?
- **Pascal**: BEGIN What if everything was structured? END
- **C++**: What if we added everything to the language?
- **C++11**: What if we forgot to stop adding stuff?
- **Rust**: What if garbage collection didn't exist?
- **Go**: What if we tried designing C a second time?
- **Perl**: What if shell, sed, and awk were one language?
- **Perl6**: What if we took the joke too far?
- **PHP**: What if we wanted to make SQL injection easier?
- **VB**: What if we wanted to allow anyone to program?
- **VB.NET**: What if we wanted to stop them again?
- **Forth**: What if everything was a stack?
- **ColorForth**: What if the stack was green?
- **PostScript**: What if everything was printed at 600dpi?
- **XSLT**: What if everything was an XML element?
- **Make**: What if everything was a dependency?
- **m4**: What if everything was incomprehensibly quoted?
- **Scala**: What if Haskell ran on the JVM?
- **Clojure**: What if LISP ran on the JVM?
- **Lua**: What if game developers got tired of C++?
- **Mathematica**: What if Stephen Wolfram invented everything?
- **Malbolge**: What if there is no god?

Languages

Languages are more similar than different.

Languages have multiple levels of communication.

My favourite word:

Breaking down problems

The journey of a thousand miles begins with one step.

– Confucius

- ▶ don't try to do too much in one go
- ▶ break problems down into smaller, manageable parts

Abstraction

Computer science is the science of abstraction.

- ▶ try to see the big picture (step back)
- ▶ focus on the only details that matter only when they matter

Planning

Planning is always a good idea.

FORTRAN – 18 person-years.

(Grace Hopper coined the term *compiler*).

Specifications really matter

PHP is not formally specified (as of July 2014)!

`http://bit.ly/1xeaQVx`

Testing out your plan

Knowing what the correct answer is helps to know if you have found the correct answer.

Always test. And then test some more.

Incorrect things

Don't say what is wrong with the world.

Just say what is right and ignore the rest.