Test: Nov 14 (really),

CSC104 fall 2012
Why and how of computing
week 8

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Text: Picturing Programs
operators and operating systems

Notes
Machines began to take over setting the program counter to a new job, collecting the output, fetching memory... but it was still one job at a time.
time sharing, version 0.1

Networking

Modem

Word processor

Crunching numbers

Slice time in 1/20 of sec (approx) & nobody "notices" they're sharing
one user, one program, one computer

dedicated - just one job (games, typesetting)
- programmer knew all details, disk access
- practically no op. sys. needed

IBM XT

Apple IIE

Commodore 64

"disk operating system to read/write hard drive & load programs"

OS shields programmer & users from hardware details

(which disk sector am I reading, which mem location reading)
task-switching to time-splitting, v 1.0

revolution! Does one task (temporarily) stop one task? start another.

by late 80s possibility of time-sharing was here.

Does one task stop, or only appear to stop, for the other?

1/20 second time slice.
Unix (mostly) to the desktop

GUIs, time-sharing, networking, flame-wars

- Mainframe migrate
  - Several users, several programs
  - Networking
  - GUIs

OS X

In hints from BSD UNIX

MS Windows

Had UNIX-like features NT forward

Linux

BSD UNIX
ATT UNIX
an operating system should have

- kernel (shell, shielded access to hardware, referee sharing)
- utilities
  - list files
  - format disk

\[ \approx \frac{1}{20} \]
a blast from the past
really bad text encryption

Encrypt "STRING"
move 13 lower in alphabet
add/subtract 13 modulo 26 (remainder)

add 13 in A-M
subtract 13 in N-Z

HELLO

URYBB

Rot13

A B C D E F G H I J K L M
N O P Q R S T U V W X Y Z
rot13 as an algorithm

► What is given, what’s required?
\[ \text{rot13}\colon \text{string} \rightarrow \text{string} \]

► Redo the last step for a single character
\[ \text{rot13}\colon \text{char} \rightarrow \text{char} \]

► What is a really simple rule (or set of rules) for (rot13 c), where c is some character?
\[
\begin{align*}
\text{if } c \text{ is in } \text{A-M}, & \text{ add 13} \\
\text{if } c \text{ is in } \text{N-Z}, & \text{ sub 13}
\end{align*}
\]

► It might help to know that characters \#\text{A} through \#\text{Z} have ascii encodings 65 through 90.
more rot13

- What about characters that aren’t in \#A through \#Z?

- What about lower-case characters?

- How do we get from characters to strings of characters?
reversing strings

Give step-by-step instructions to reverse “string”

- given/required?
  \[ \text{string-reverse : string} \rightarrow \text{string} \]

- check-expect some small examples?
  "ab" \(\leftrightarrow\) "ba"
  "a" \(\leftrightarrow\) "a"
  "" \(\leftrightarrow\) ""

- try to write down a recipe
  \[ "ab" \rightarrow (\text{string-append} (\text{string-reverse} "b") "a") \]
  \[ "abc" \rightarrow (\text{string-append} (\text{string-reverse} "bc") "a") \]
How do you recognize a palindrome, such as “rotor” or “ACTAGATCA”?

- given/required?
- check-expect a small example or two
- try to state the recipe