# CSC104 winter 2013

## Computational thinking

## week 8

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Text: Picturing Programs

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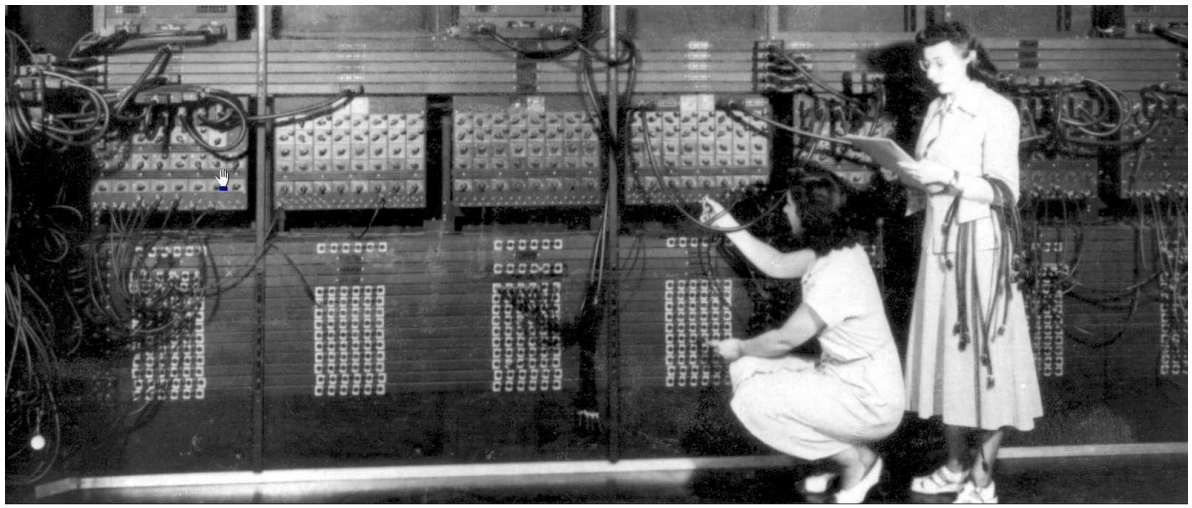
# Outline

operators and operating systems

Notes

# machines take over in batches

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.

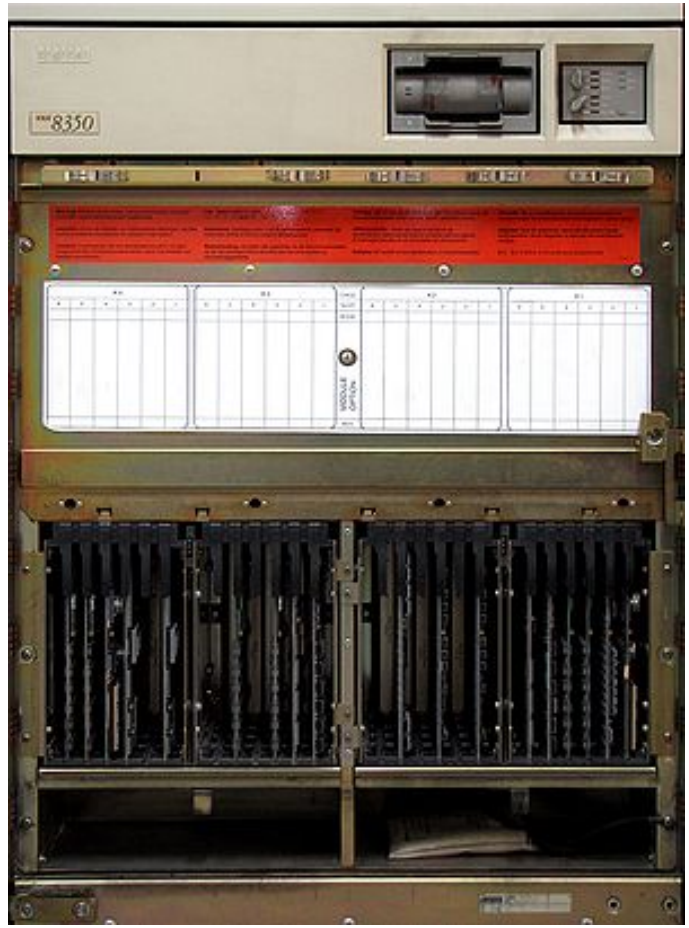


# time sharing, version 0.1





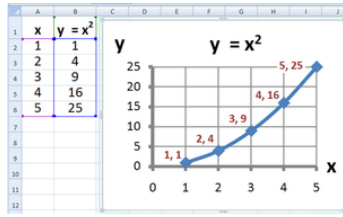




# one user, one program, one computer



# task-switching to time-splitting, v 1.0




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

# unix (mostly) to the desktop

## GUIs, time-sharing, networking, flame-wars

# an operating system should have

- kernel (shell, shielded access to hardware, referee sharing)
- utilities

# Notes