# Operating System

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*EE-309: Microprocessors*

Lecture 41 (02 Nov 2015)

CADSL

# Single Lane Traffic

# Highway

# Express Way

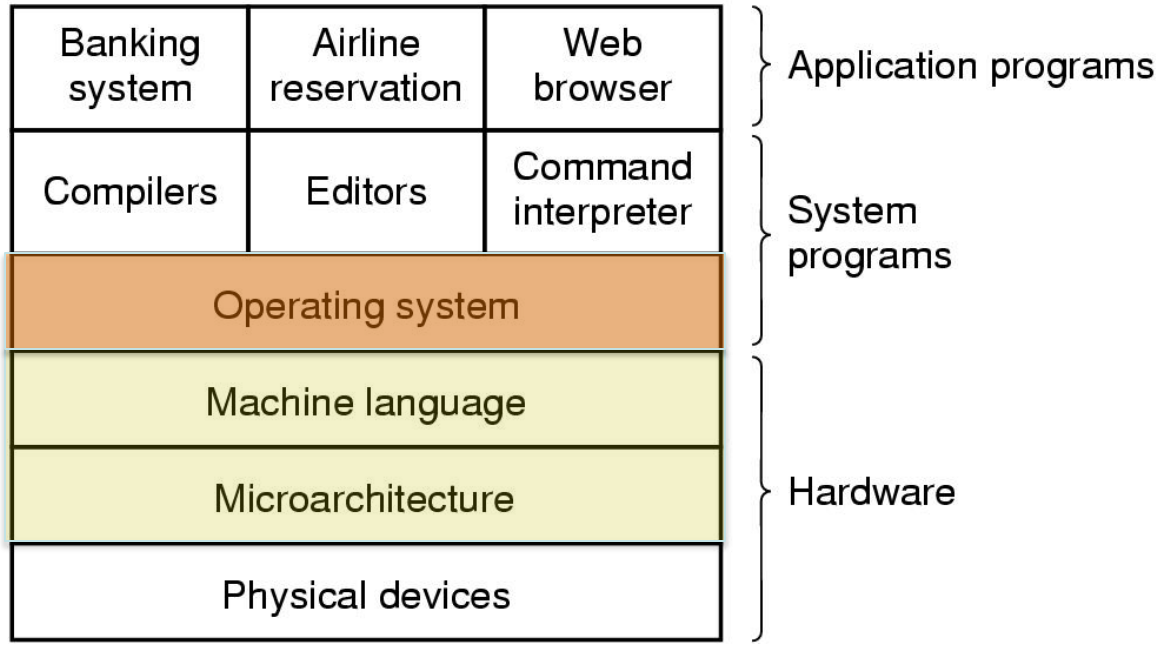
# Bad Traffic

# Advanced Architectures

- Processor Design (EE-739) in Spring 2016
  - Out of order execution
    - Superscalar Architecture
    - VLIW Architecture
  - Simultaneous multithreaded architectures
  - Multicore architectures
  - Multicore interconnects (Network on Chip)
  - GPGPU architectures
  - Dynamic core architecture
  - Memory system for multicore architectures

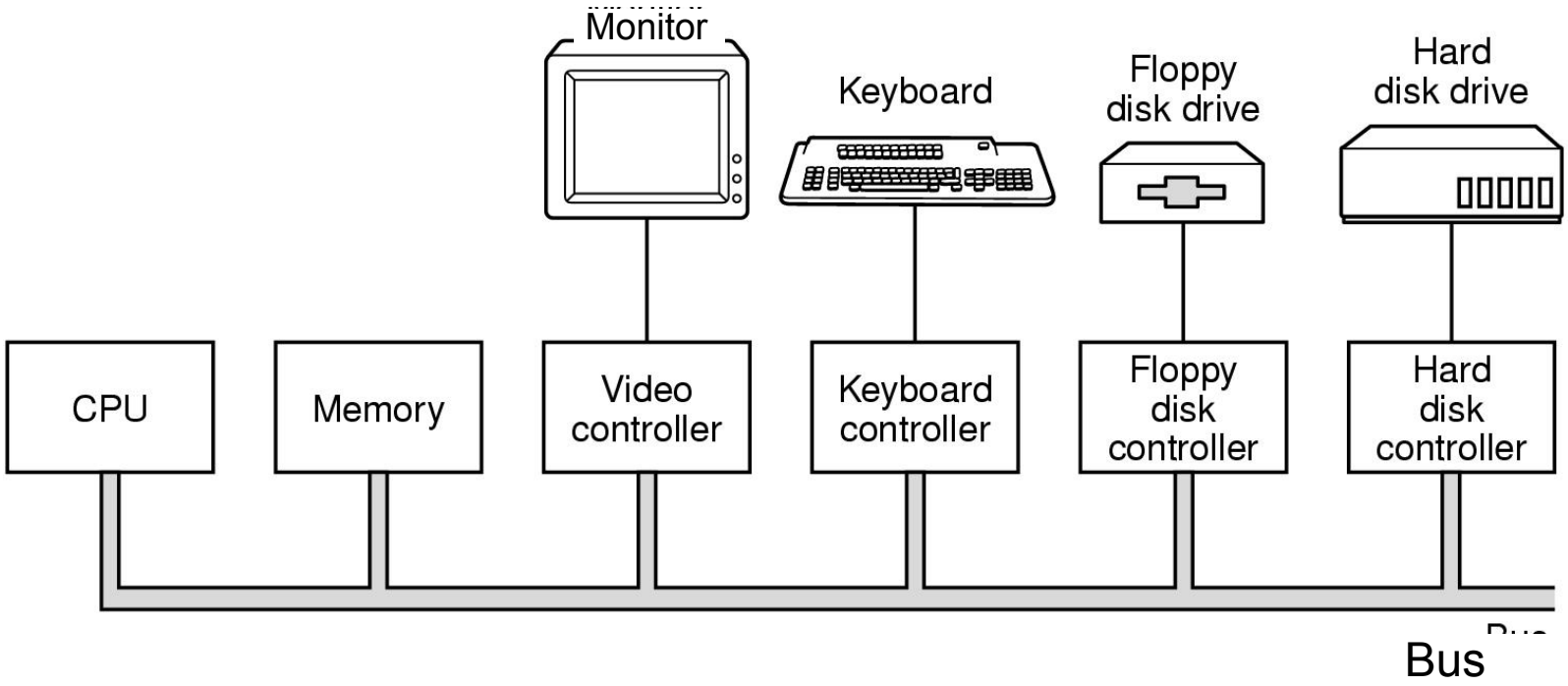
# Operating System

# Introduction




- A computer system consists of
  - ✧ Hardware
  - ✧ System programs
  - ✧ Application programs

# Computer Hardware Review




- Components of a simple personal computer

# What is an Operating System?

- It is an extended machine
  - Hides the messy details which must be performed
  - Presents user with a virtual machine, easier to use

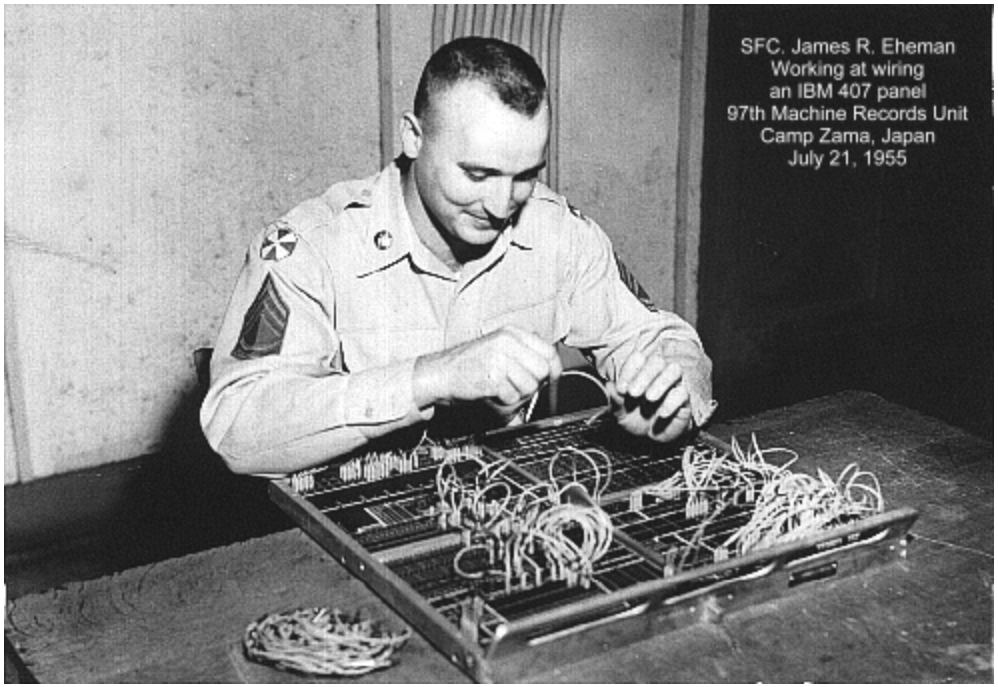
- It is a resource manager
  - Each program gets time with the resource
  - Each program gets space on the resource

# History of Operating Systems

- First generation 1945 - 1955
  - vacuum tubes, plug boards

- "Programming" was hand-wiring plugboards.

- No Operating System

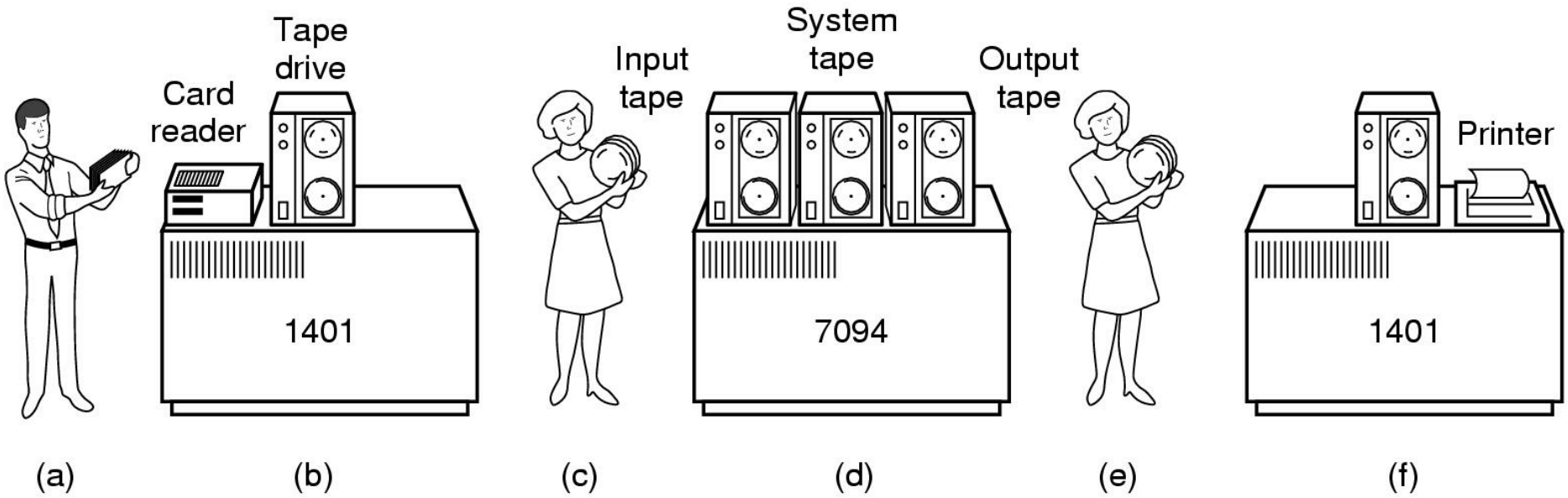



"Hmm, should I pass this parameter by value or by reference?"

# History of Operating Systems

- First generation 1945 - 1955
  - vacuum tubes, plug boards
- Second generation 1955 - 1965
  - transistors, batch systems

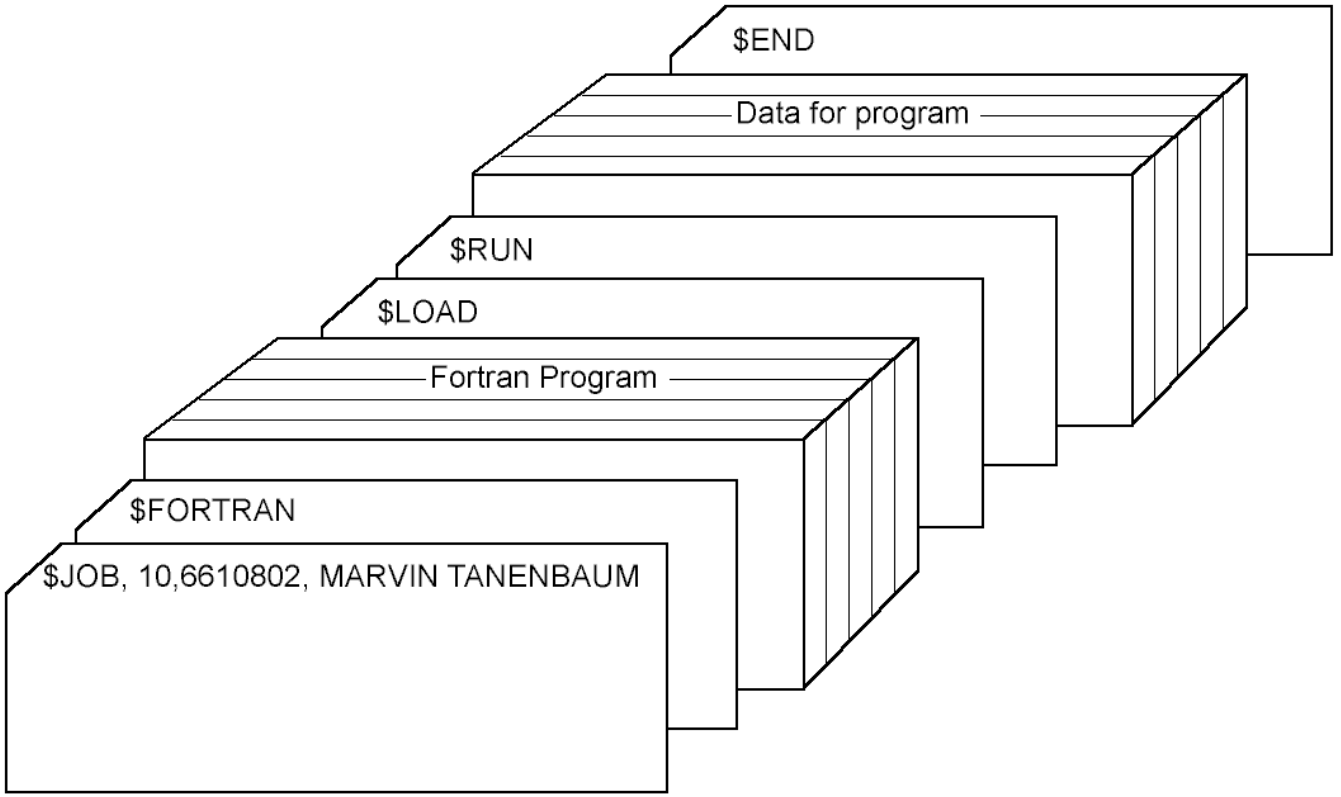
# History of Operating Systems




Early batch system

- bring cards to 1401
- read cards to tape
- put tape on 7094 which does computing
- put tape on 1401 which prints output

# History of Operating Systems

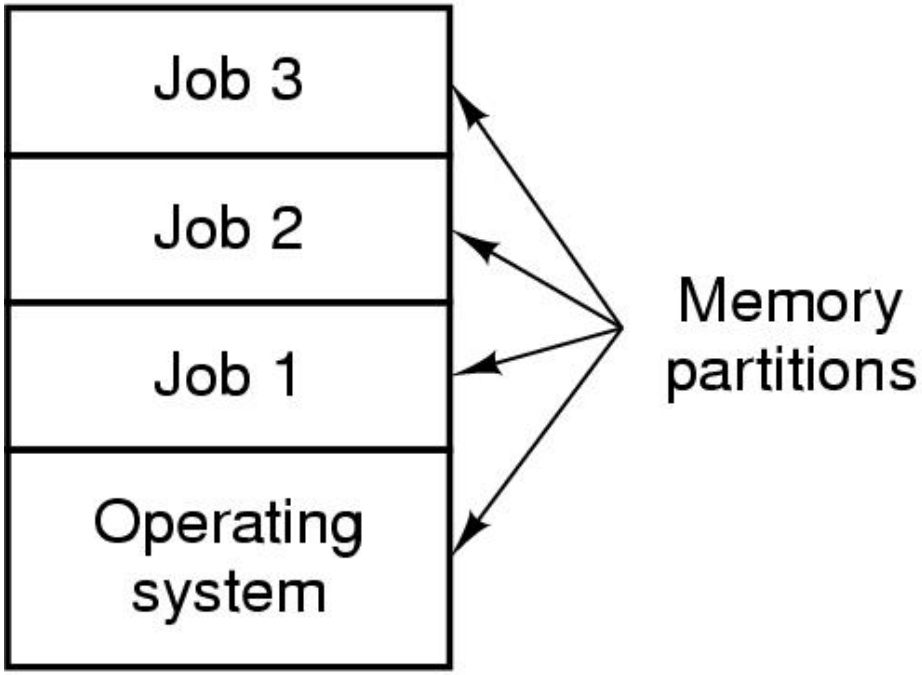



- Structure of a typical FMS job – 2nd generation

# History of Operating Systems

- First generation 1945 - 1955
  - vacuum tubes, plug boards
- Second generation 1955 - 1965
  - transistors, batch systems
- Third generation 1965 – 1980
  - ICs and multiprogramming

# History of Operating Systems




- Multiprogramming system
  - three jobs in memory – 3rd generation

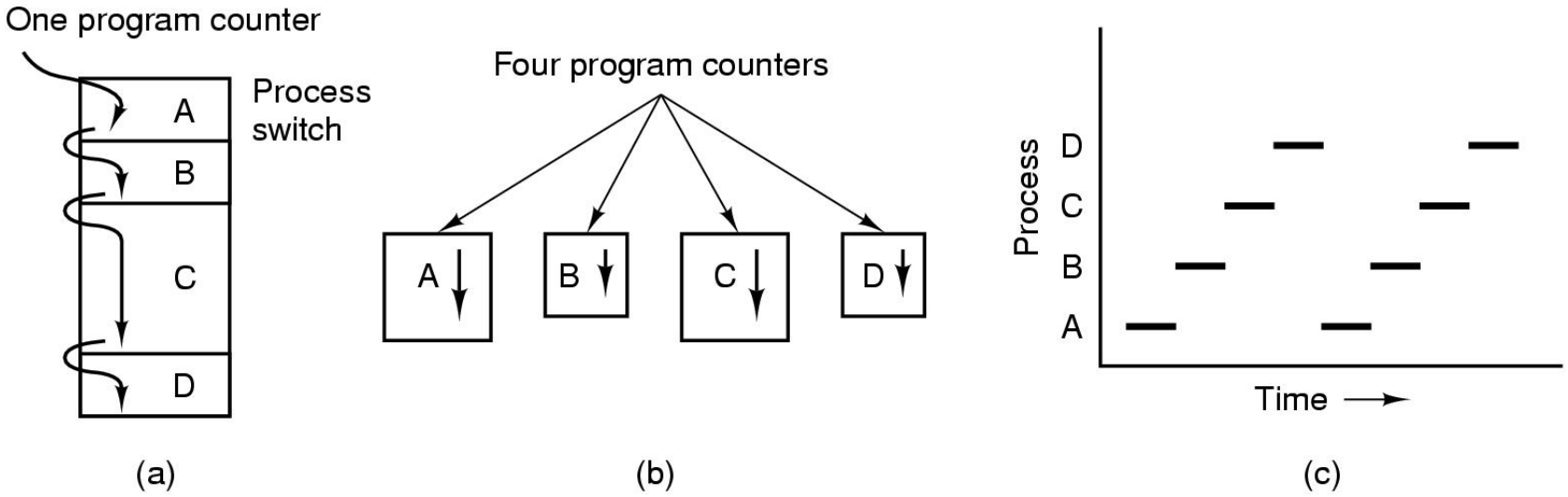
# The Operating System Zoo

- Mainframe operating systems
- Server operating systems
- Multiprocessor operating systems
- Personal computer operating systems
- Real-time operating systems
- Embedded operating systems
- Smart card operating systems

# Program vs Process

- Program is a passive entity which specifies the logic of data manipulation and IO action
- Process is an active entity which performs the actions specified in a program
- Multiple execution of a program process leads to concurrent processes

# Processes: The Process Model




- Multiprogramming of four programs
- Conceptual model of 4 independent, sequential processes
- Only one program active at any instant

# Process Creation

Principal events that cause process creation

1. System initialization
2. Execution of a process creation system
3. User request to create a new process
4. Initiation of a batch job

# Process Termination

Conditions which terminate processes

1. Normal exit (voluntary)
2. Error exit (voluntary)
3. Fatal error (involuntary)
4. Killed by another process (involuntary)

# Thank You