Example of an early computer system

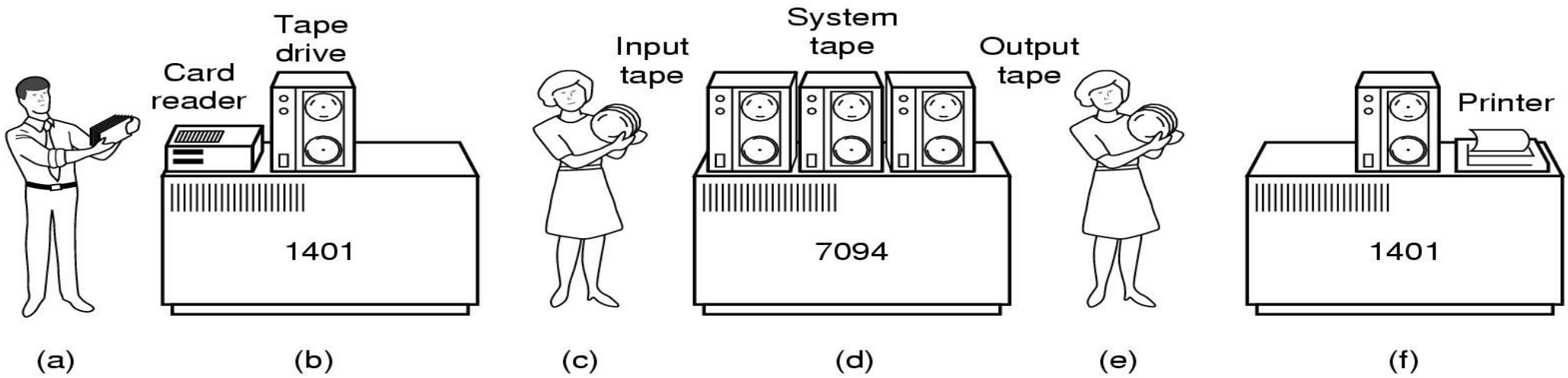
First generation: direct input

- Run one job at a time
  - Enter it into the computer (might require rewiring!)
  - Run it
  - Record the results
- Problem: lots of wasted computer time!
  - Computer was idle during first and last steps
  - Computers were ***very*** expensive!
- Goal: make better use of an expensive commodity: computer time

solution

- Paper tape is slower than the tape drive.
- New device called tape is invented.
- Remember video or audio cassette

History of Operating Systems (1)



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

To prepare a FORTRAN program for execution

1. LOAD the FORTRAN compiler in to the computer. The compiler was normally kept on a magnetic tape . So it would need to be mounted on a tape drive.
2. The program would be read through the card reader and written onto another tape.
3. The compiler would then take the program as input and then produce assembly language output.
4. The assembler would now need to assemble the above output. This would mean mounting another tape with the assembler.
5. The output of the assembler would need to be linked with its supporting library routines.
6. Finally the binary object form of the program would be ready to execute.

Problem

1. Setup time for execution

2. CPU utilization.

Solution

Batch programming:

Computer operators batch similar types of jobs together and execute.

All C programming jobs

Then all JAVA programming jobs.

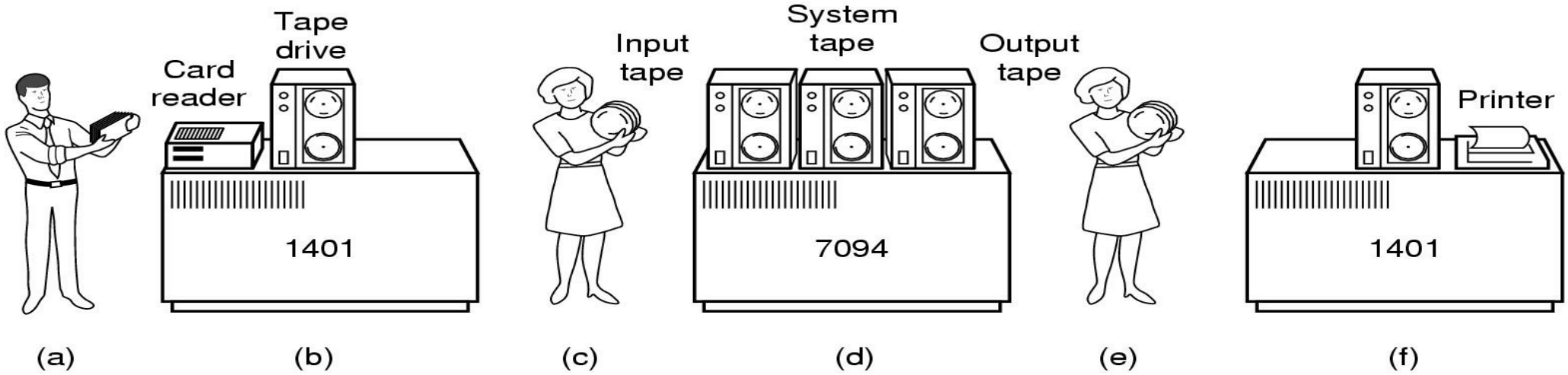
SPOOLING

When a job is involved with I/O operation the CPU sit idle because the I/O devices are very slow compared to CPU.

To overcome this off-line processing was used.

CPU does not read or write to cards or printers(tapes).

spooling


Tape drive
Card reader
1401
Input tape
System tape
Output tape
7094
Printer
1401
(a)
(b)
(c)
(d)
(e)
(f)

SPOOLING

There was a problem with tape....

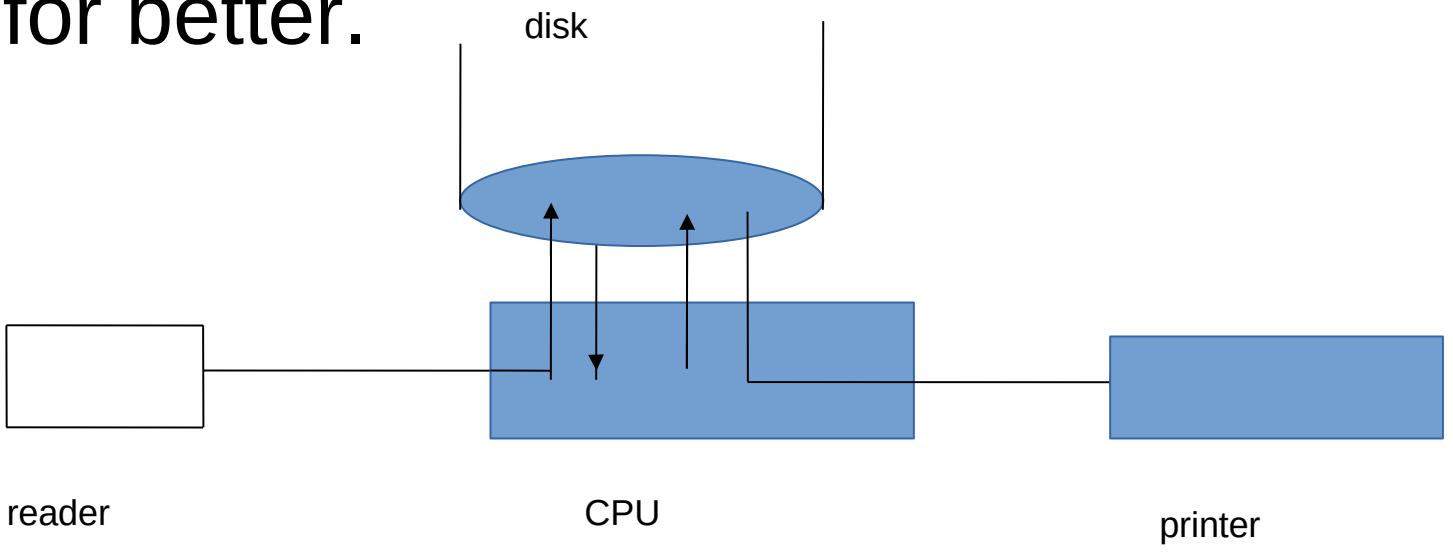
Tape is sequential access device

If some one is writing into the beginning of the tape no one can read from the end of the tape...

Because there is single head to read and write in the tape.

SPOOLING

Disk became widely available and things changed for better.



SPOOLING

Read and write can be done simultaneously in Disk.

And it is a random access device(example HDD

Vlc and programming)

SPOOLING
(Simultaneous Peripheral Operation On-Line)

In a disk system cards are read directly from the card to the disk.

When a job is executed and a card is needed as input the equivalent record is read from the disk.

Similarly the output is written onto the disk.

This is known as SPOOLING.

Spooling can keep both the CPU and the I/O devices work at much higher speed.

BY that time memory became large...

More than one processes can be loaded in the memory at the same time.

Still problem

CPU still not utilized fully....

E.g:

When a job stopped the operator would have to notice that by observing the console , Determine why it stopped(normal / abnormal) and then take a necessary actions.

CPU Switching from one job to another takes time