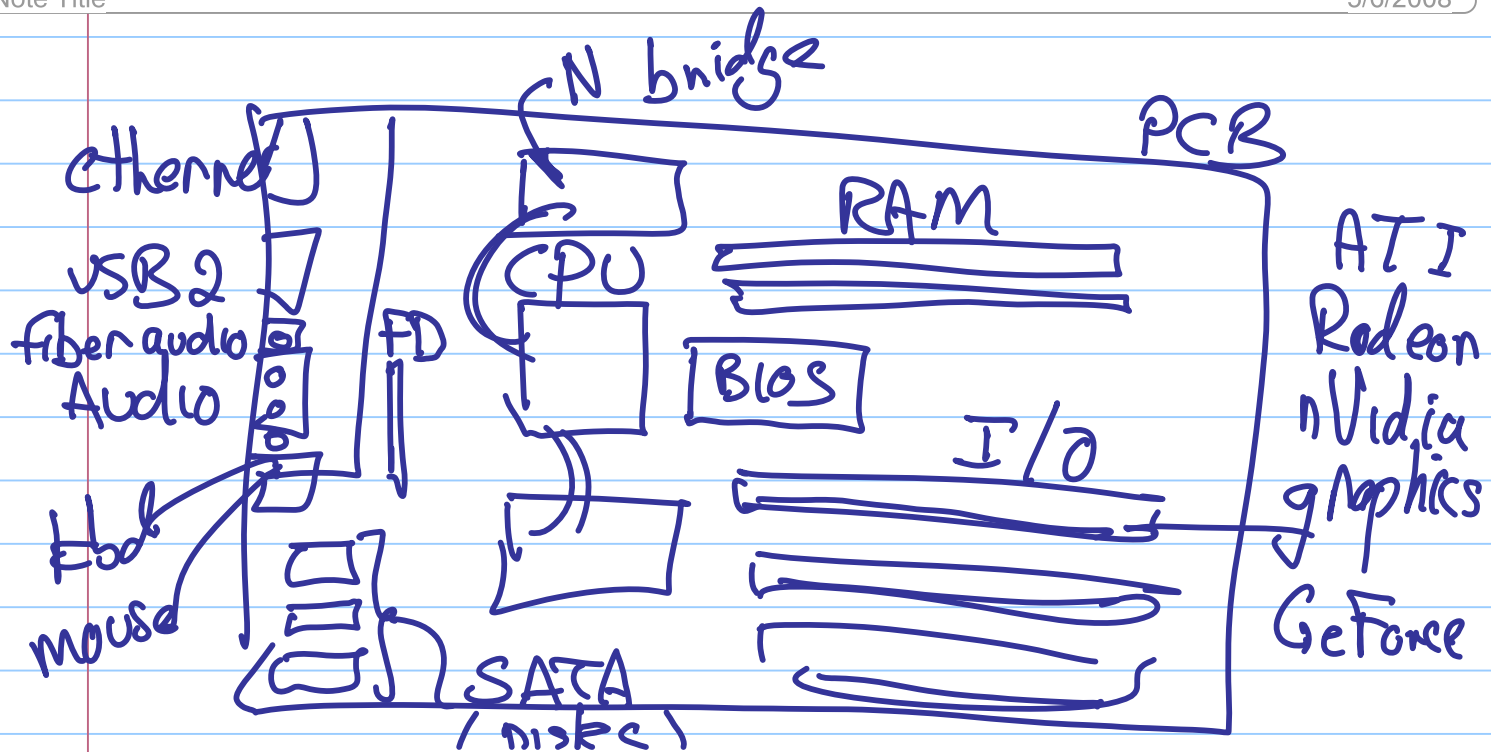
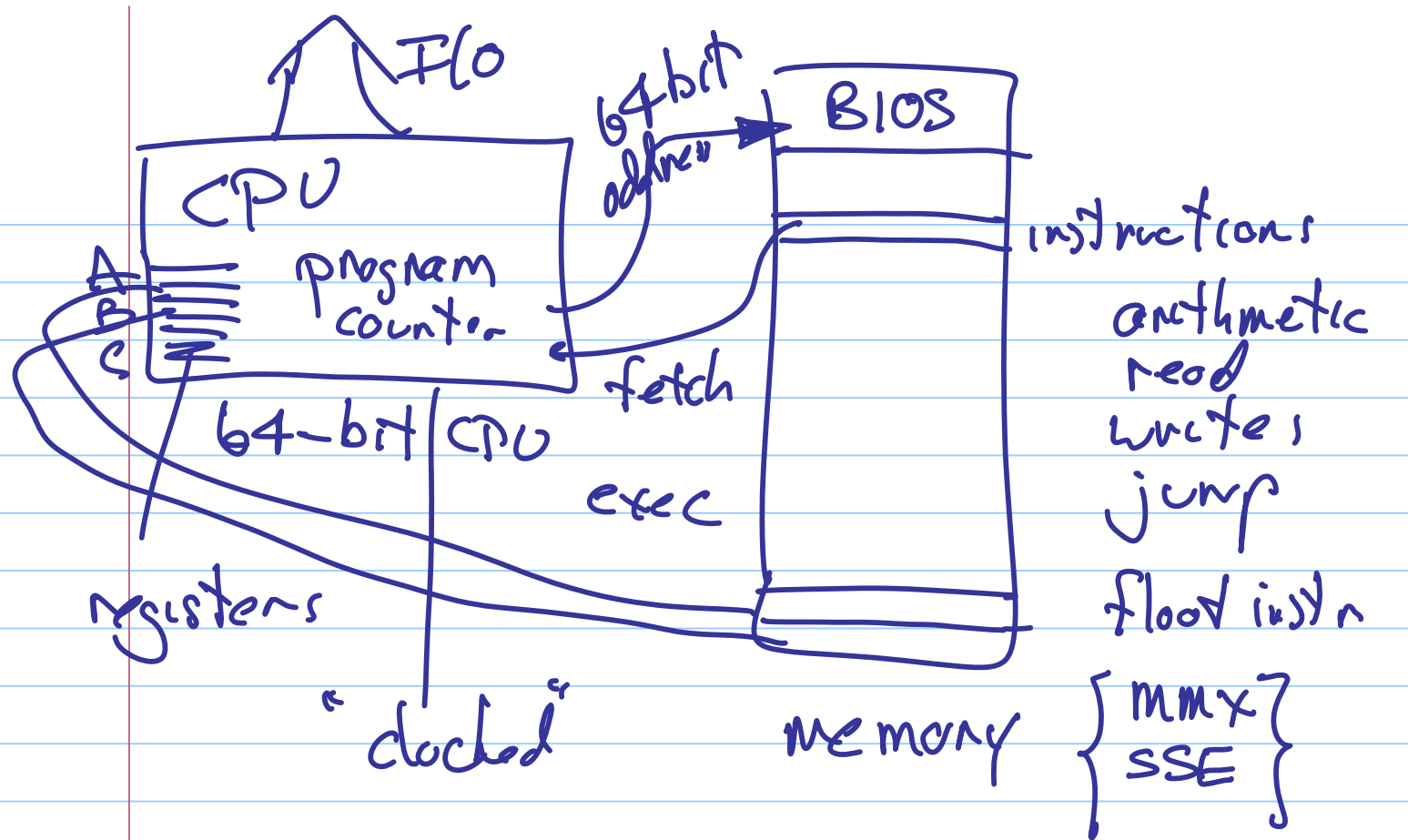


Lesson 11

Note Title

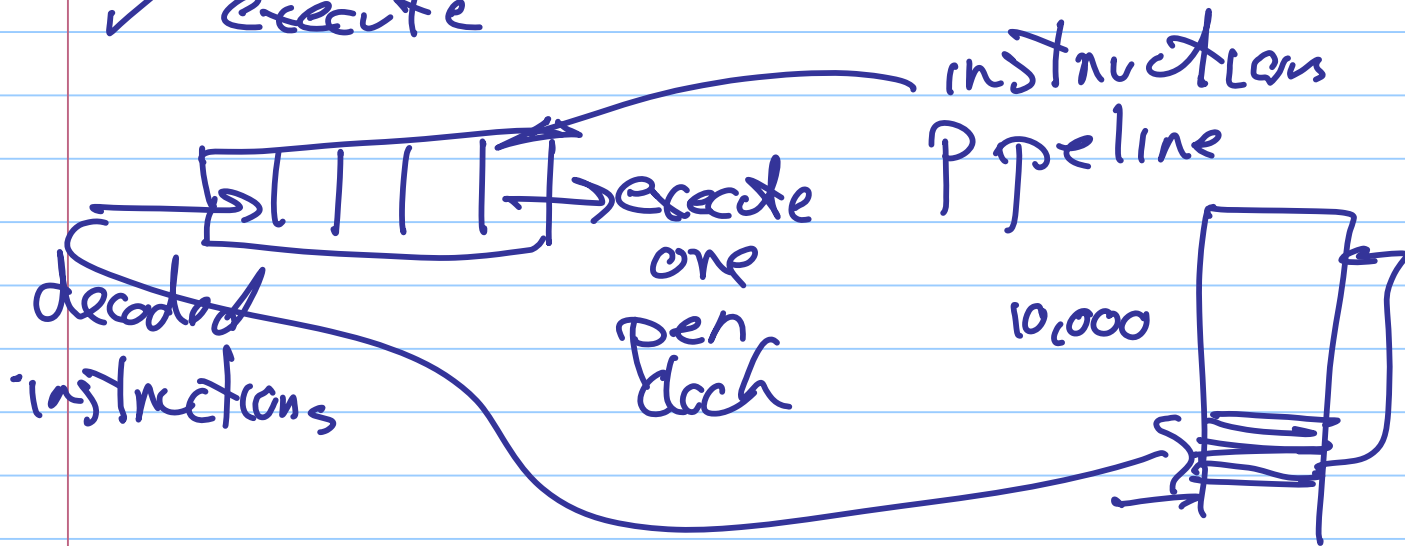
5/6/2008

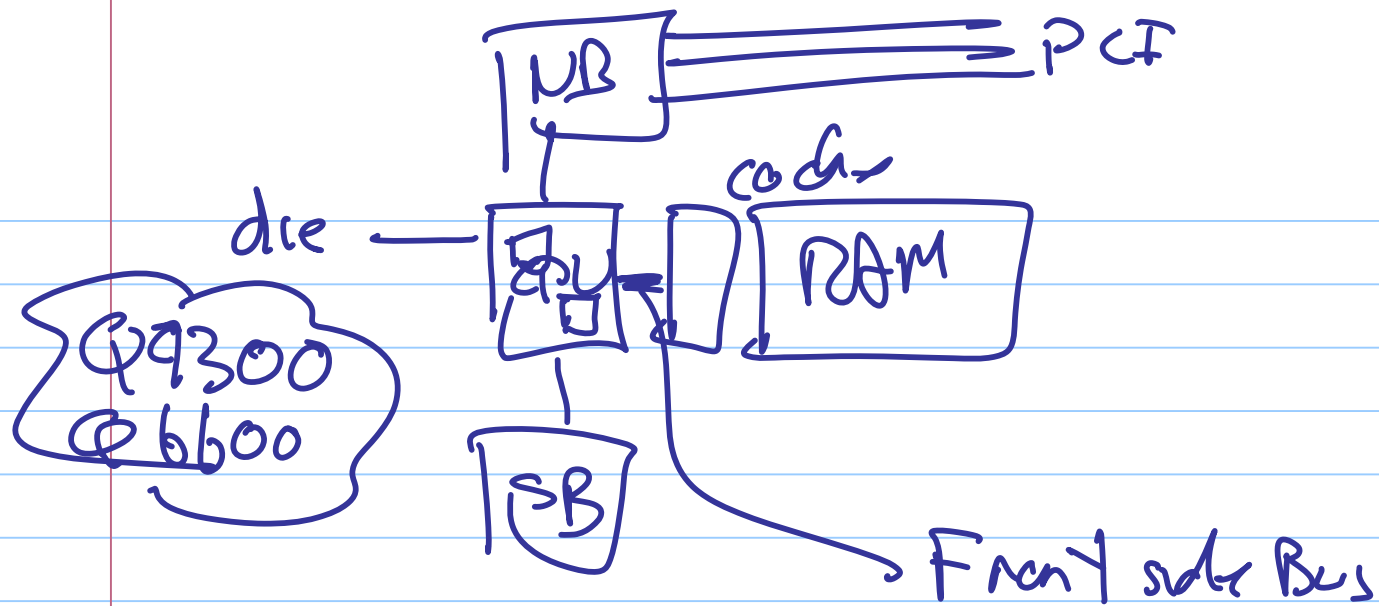




Basic CPU operation

- ✓ set program counter
 - ✓ fetch the instruction there
 - ✓ decode
 - ✓ execute
- } 4 clock cycles



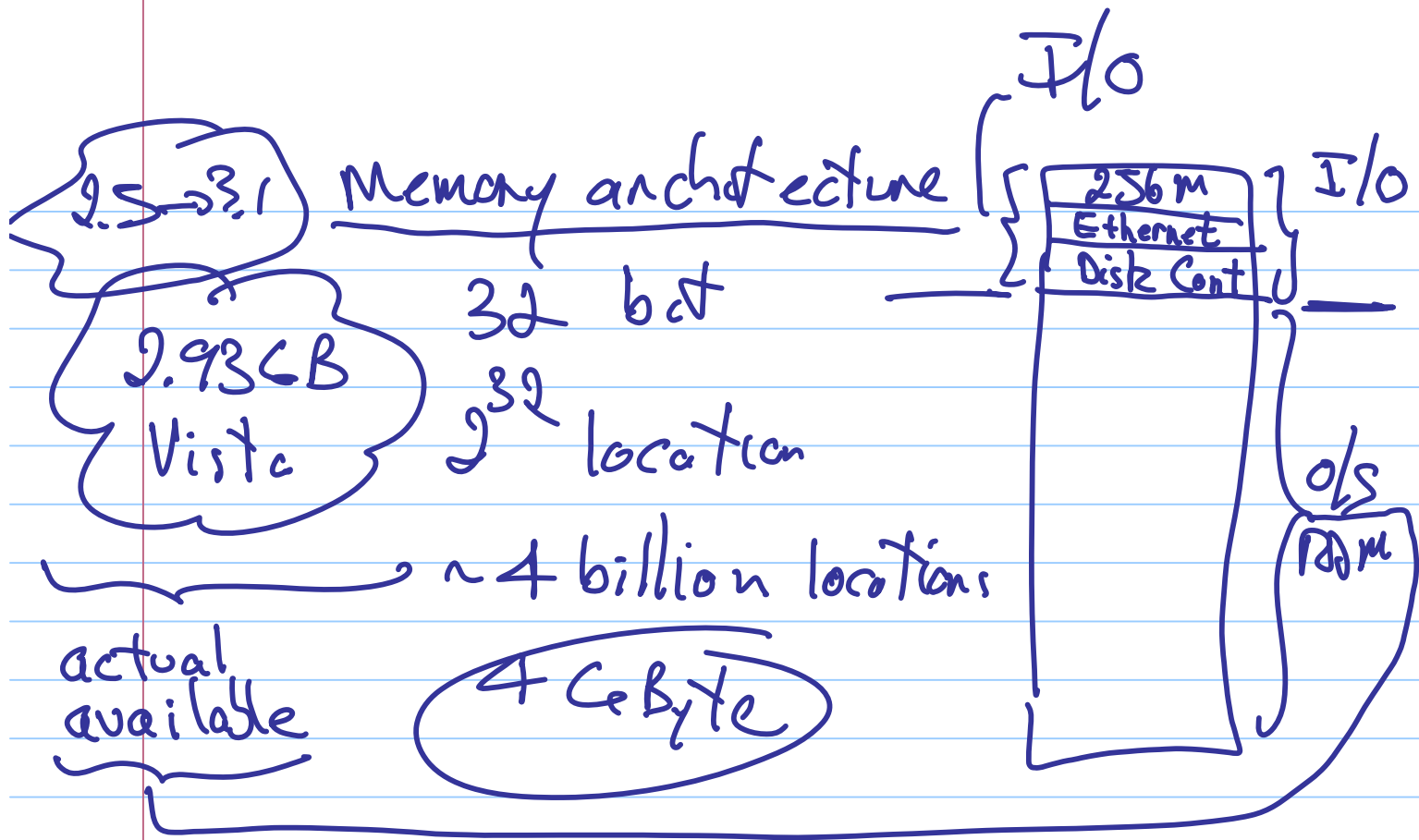


MacBook Pro

Intel core 2 duo

1333 MHz

667 MHz

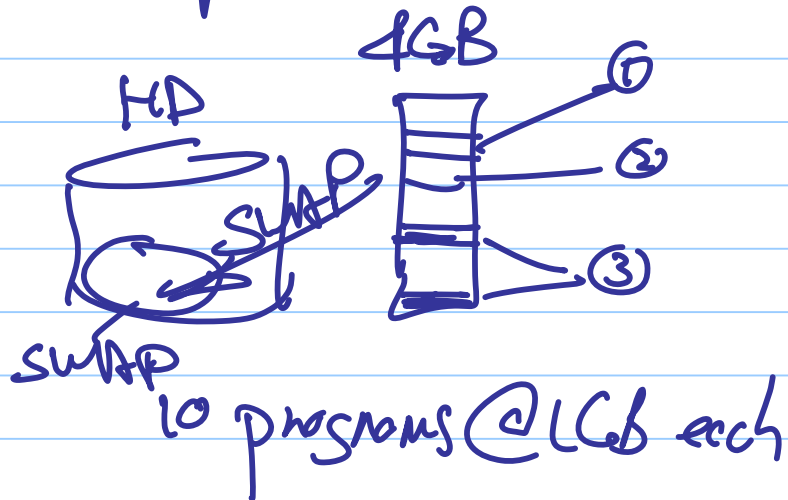


Tuning a computer memory management

CPU

RAM

PLSR



protected memory

multitasking

1 CPU → 4 cores

10 programs

time slicing

SMP

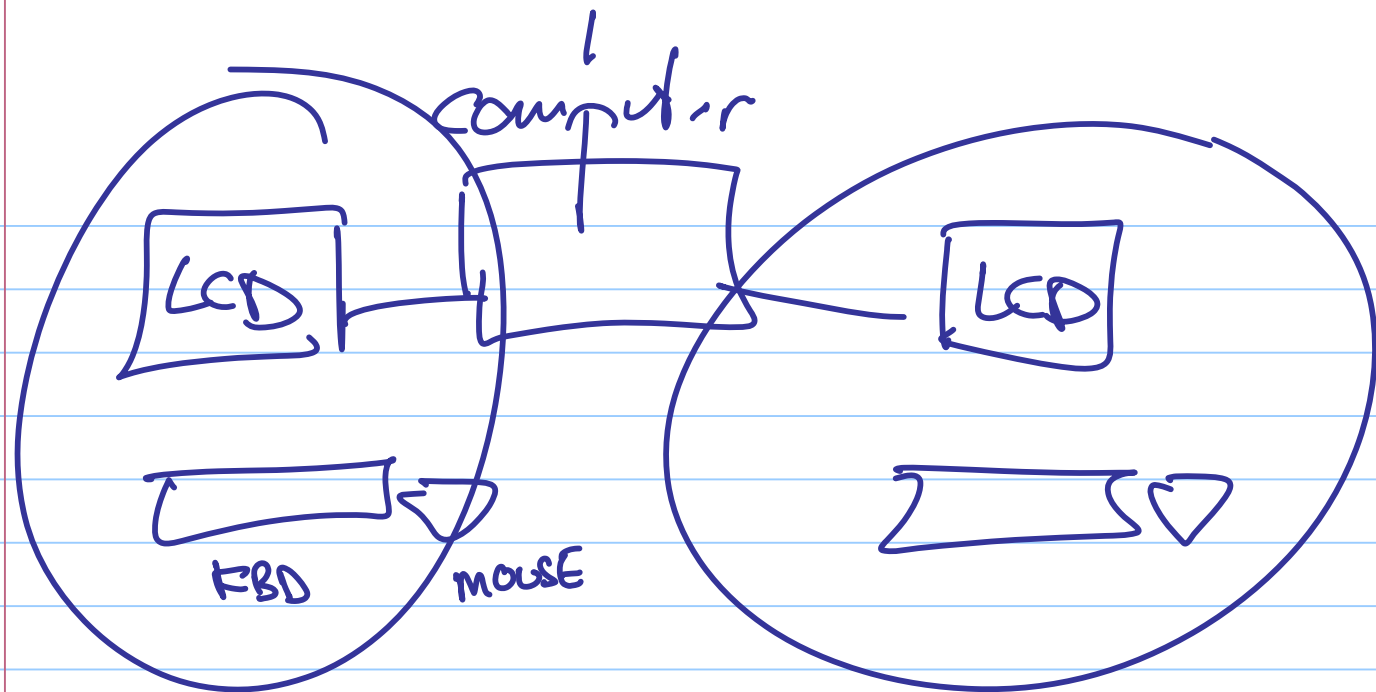
Symet/acc

Multi-

Processing

concurrent
I/O } mouse clicks } USB
 } typing }
 } open file (FD)
 } open web page (Net)
 } video conf

multiple
screens



multi-user support / possible in Linux

✓ Remote Desktop → multi-user

✓ separate user accounts

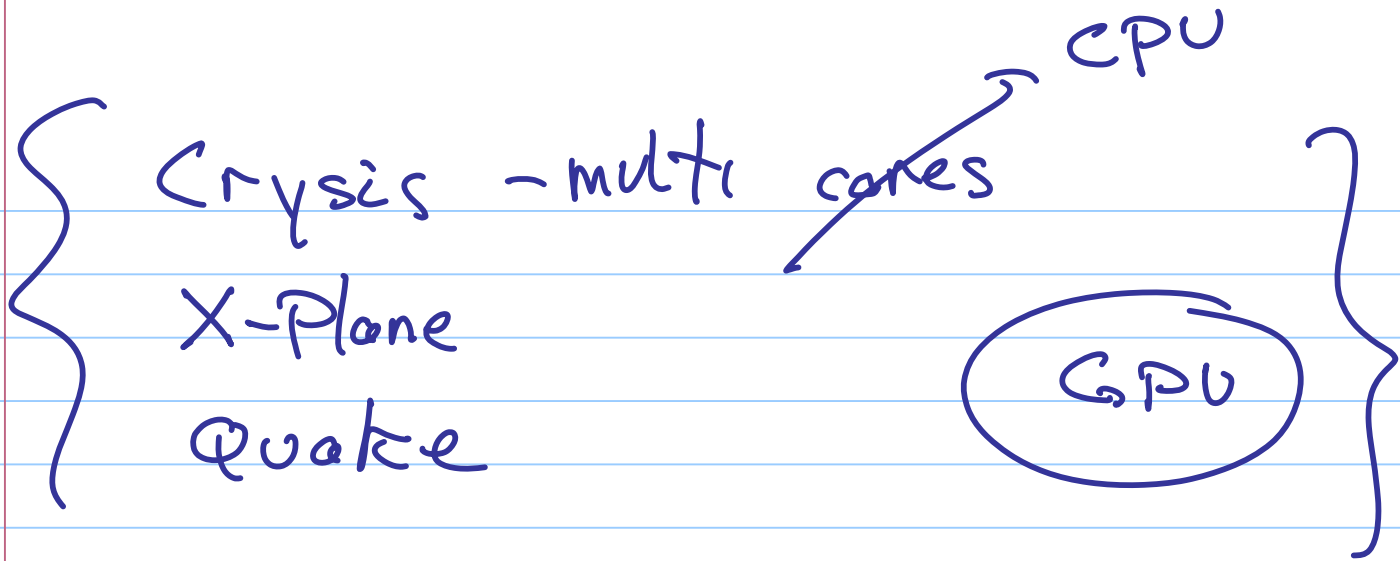
✓ file system recognizes owners

✓ multiple logins, 1 active session

1 CPU 3GHz $\pi: 10^{10}$ digits
one hour

1 CPU 6GHz 30 minutes

(2 core)
CPU 3GHz can programme
split into multi-
threads?



XBox 360 PS3 } multi-core

games : AI

collision

threads

~~free~~
Windows
process
explorer
MSFT

graphics
sound

network

User interface

Windows Task Manager

File Options View Help

Applications Processes Services Performance Networking

Image Name	User Name	CPU	Memory (Private)	Threads	Description
TabTip.exe	iCheckout	02	5,456 K	28	Tablet PC Input Panel Access
explorer.exe	iCheckout	00	6,800 K	1	Windows Explorer
csrss.exe	SYSTEM	00	1,032 K	1	Client Server Runtime Process
upeksvr.exe	SYSTEM	00	876 K	14	Fingerprint Server Process f
taskeng.exe	iCheckout	00	1,204 K	13	Task Scheduler Engine
TabTip.exe	SYSTEM	00	1,392 K	13	Tablet PC Input Panel Acces
InputPersonal...	iCheckout	00	740 K	12	Input Personalization Server
MSASCui.exe	iCheckout	00	5,456 K	11	Windows Defender User Inte
wisptis.exe	iCheckout	02	2,212 K	11	Microsoft Tablet PC Input Co
Journal.exe	iCheckout	00	29,224 K	11	Windows Journal
iTunesHelper....	iCheckout	00	1,048 K	10	iTunesHelper Module
shstat.exe	iCheckout	00	396 K	8	VirusScan tray icon
irftp.exe	iCheckout	00	1,448 K	7	Infrared File Transfer Applic
sidebar.exe	iCheckout	00	2,320 K	7	Windows Sidebar
taskmgr.exe	iCheckout	09	2,564 K	6	Windows Task Manager

Show processes from all users

End Process

Tools Help

multiple threads of execution

core  CPU

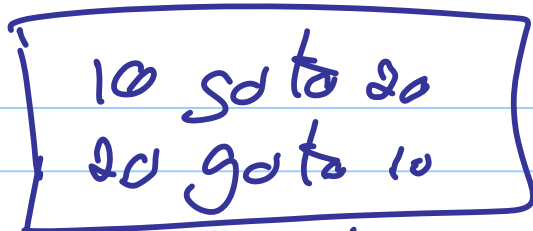
single thread

100% CPU
on one
CPU

loop 1
10 go to 20
20 go to 10

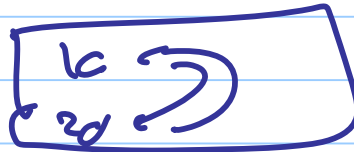
loop 2
10 go to 20
20 go to 10

2 cones



50%

2 cones



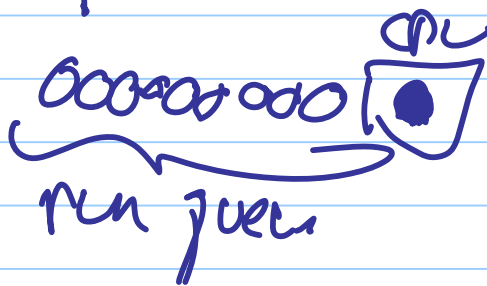
100%

% utilization users $0 \rightarrow 100\%$

load factor (uptime)

average # programs in run queue

10 program



load factor 9

Big : 64-bit 8 core

32 GB

3GHz CPU

Next : scaling via distributed

processing : Thursday