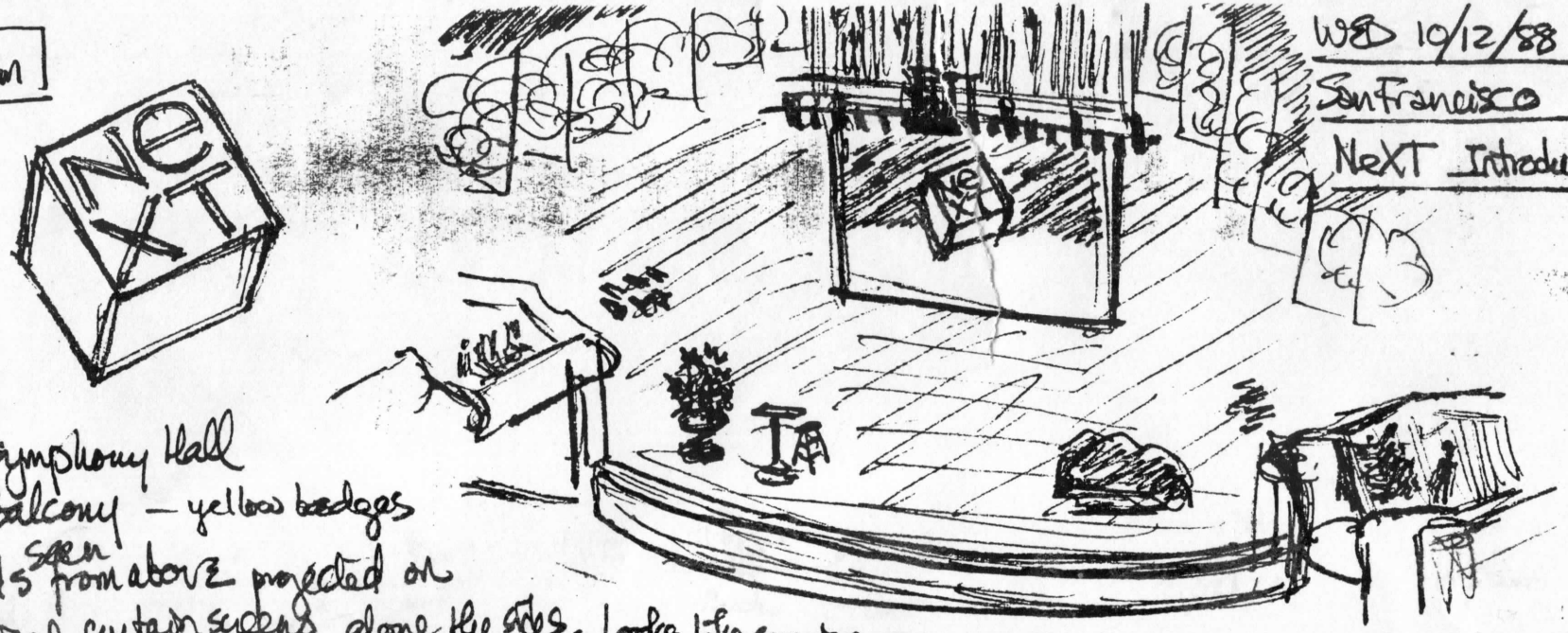
9:30 am

WED 10/12/88

San Francisco

NeXT Introduction



Symphony Hall

Upper Balcony — yellow badges

Red Clouds seen from above projected on vertical curtain scrims along the sides. Looks like sunrise.

Theme: minor melody four phrases. canon. Repetitive + variety.

Luminaries Seen: Kapor, Wolfram.

Jobs walks out. Applause.

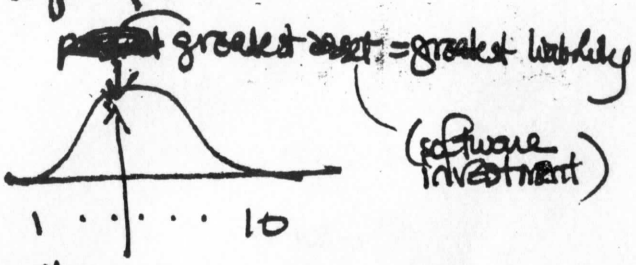
"Great to be back"

"I haven't done this for a few yrs"

Today: What we did + why we did it.

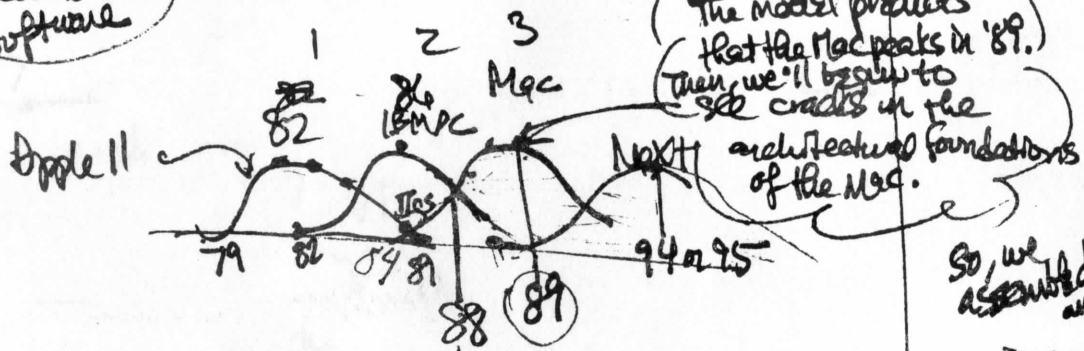
OUR MODEL

Computers have a 10 yr life.



growth → peak → glide slope.

accumulated software



The model predicts that the Mac peaks in '89. Then, we'll begin to see cracks in the architectural foundations of the Mac.

Crossover point for Market momentum.

Most new aggressive software is targeted now for the Mac than for IBM PC.

WS's don't make a wave yet — there aren't enough out there.

Who is Higher Ed?

> 3000 colleges & universities in USA alone.
> 45,000 depts
> 600,000 faculty
> 12M students

"Fortune 500 disguised under another name"
- Stanford $750M op budget
- UM $1B

So, we assembled an Advisory Board — 24 university leaders in Higher Ed. [Slides shows names.]

COMPUTING NEEDS

("UNIX cannot be used by mere mortals")

1. Power of UNIX, married with "ease of use" multitasking, networking
2. Fast: 5 mips, floating pt, array processing
3. Lots of memory: 8MB RAM, 100+ MB Local disk
4. Unified imaging model: PostScript

Stanford circles. Jobs talks about Higher Ed as the appropriate birthplace of the Next computing revolution.

WSJ ad - "Manifesto" Jobs reads it.

"... the Next computer will be more than a dedicated tool, but a Partner in thought."

[Applause].

Needs ctd

5. MegaPixel display (big screen)
   ("we're tired of scrolling")
6. Fast, transparent networking built in
7. Great sound
8. Expandable into the 90's
   — Open architecture
9. Small, cool, quiet, reliable
   — like early PC's. (Mainframes are big, hot, lossy.)
10. Affordable laser printing

~~What~~?

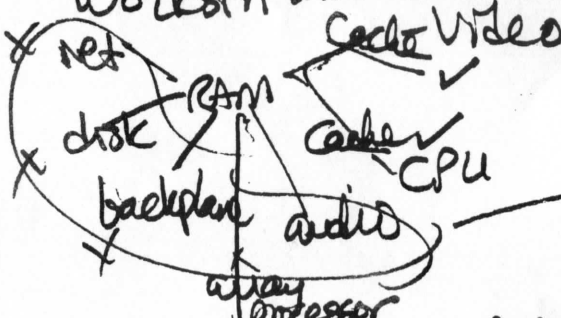
PC architecture?

RAM < Video, CPU

Problems

10X video
10X CPU
RAM breaks.

Workstn architecture?



Problem

Again, RAM breaks
→ break when you have all these attached devices slowing it down.

MIPS is only 25% of the performance equation.
Overall system throughput is the other 75%.

Has anyone solved this problem?

Yes: mainframe architecture! (slide of Big Blue room)

They put I/O processors at each I/O channel

↓

Higher ed wants a Personal Mainframe!

	Fast PC's	WS's	NeXT	mainframes
Thruput MB/sec	10	20	32	40
# PC boards	3+	3-10	1	10+
Chips	100+	300+	45	1000+
Cost (K$)	5-10	10-50		100+

pretty daunting!

We put a mainframe on 2 VLSI chips.

NeXT Architecture (Hardware)
NeXT CPU: Coop with Motorola

12 I/O Processors each with own DMA

16 MB of RAM

Processors:

68030 CPU	68882 FPU	56000 DSP

68882 FPU: Floating Point Unit
56000 DSP: Digital Signal Processor

simultaneously!

SOUND H/W

1. CD quality stereo output ≡ $1000 CD player
2. μphone input
3. DSP — 10 MPS
   candidates: ~~Speech~~, music, sound, Array proc, Image proc
   Modem, Fax, Encryption
   Speech — CMU
   Music Synthesis — Stanford "Karma" project

Revolution = Raise the lowest common denominator
... because S/W dve's must use the LCD.
Are bound by it. (Like the Mac 9" screen)
Our LCD is a complete system:
A 1-ft square board.

(NuBus? CMOS?)

NuBus + All CMOS + 25 MHz

The Board: built totally untouched by human hands. In the most advanced factory of its kind.

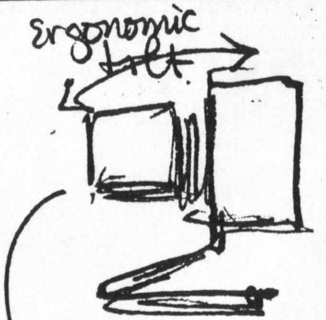
[Film: the Machine to Build the Machines.
John Williams — old triumphant score.]

PACKAGING — How?

1. Like the Mac? ⊖ screen built in.
2. PC? ⊖ size gets bigger.
3. TOWER — underneath desk.

→ The Cube.
- 3 slots open
- power cord anywhere in the world.

Room for two full-height drives
>1 GB now; 3 GB next yr.



the monitor

- speaker
- walkman jacks
- stereo jacks

⋮

3 meter cord connects monitor to The Cube: power + all info.

"Std" mkt strategy: $ laser + ¢ impact printer

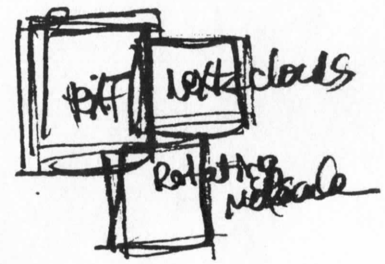
(–) Once laser, can't go back.

NeXT Laser Printer advantages

1. 60% of size of current LP's.
2. Full PS output. (No QuickDraw etc)
3. 400 dpi. (300 is "draft" mode?)
4. Price breakthru ...

The Machine demo's itself!

- "Most C's looked like this from 1950's–1984
  - PC Typing. Small ~~green~~ screen. One char at a time. Mistyping.
  - Mac – windows. Icons. 1984
  - ~~"Rites of Spring"~~ "Fanfare for the Common Man"



MASS STORAGE decision

- Floppies? (–) need 75 to ship new system
  (–) 70's tech.
- Winchester? (–) not portable.
- others: DAT? CDROM? R/W WORM opt?

the choice: R/W erasable optical technology

256 M + removable media

$50/apiece!

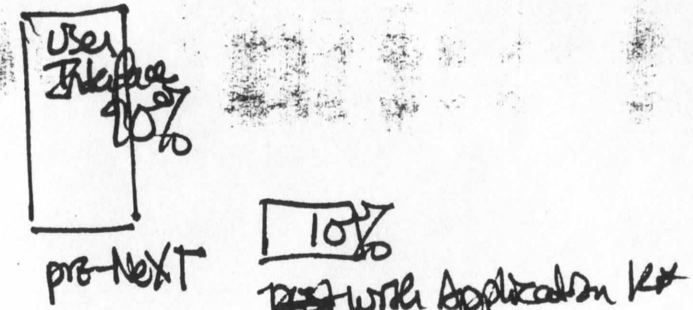
You can now put your entire life history into your backpack/purse/briefcase...

[INTERMISSION]

Industrial design story
- lackluster presentation
- unveiling
- "the way all computers will look" !!

Item 1 - human head!
boards plugged into skull

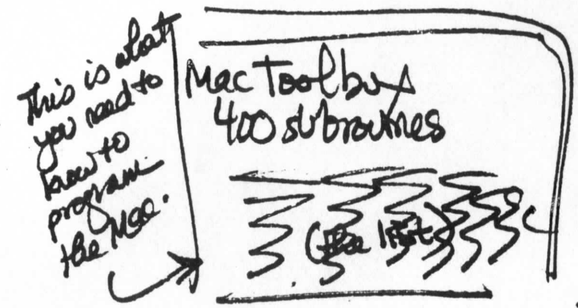
Then: Hartman

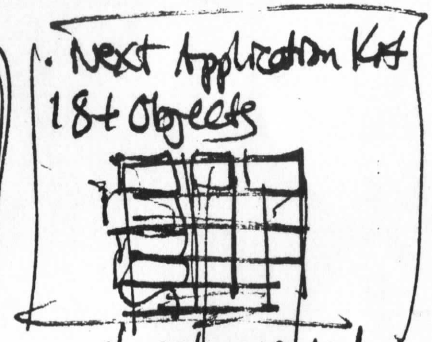


~~UNIX~~ O/S - challenge

Market said user interface

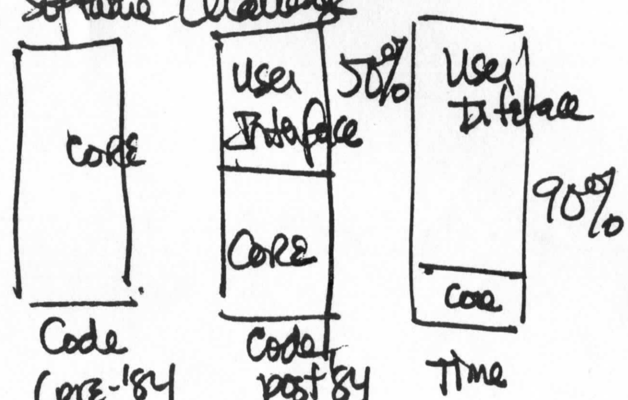
#1 Major software challenge - making developer-friendly machine!



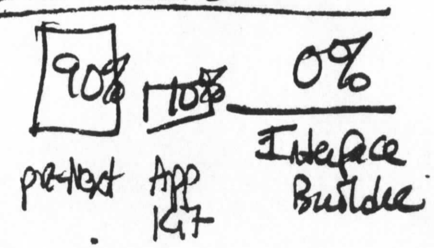


• object oriented

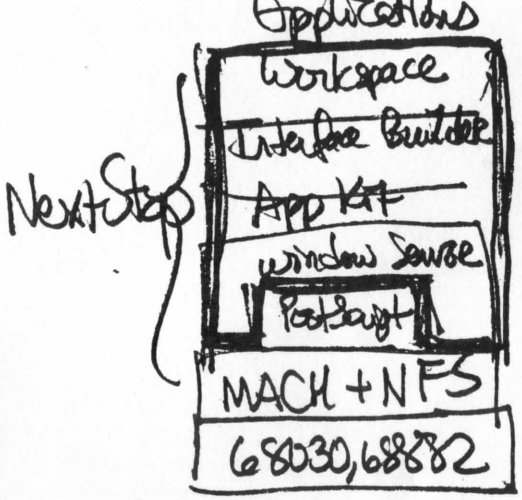
#1 Software Challenge



INTERFACE BUILDER



SOFTWARE ARCHITECTURE



NEXT + ADOBE partnership

- Interactive PS
- An order of magnitude faster

LAWS OF DEMOING

1. Demos always crash
2. Prob goes up with N people watching!

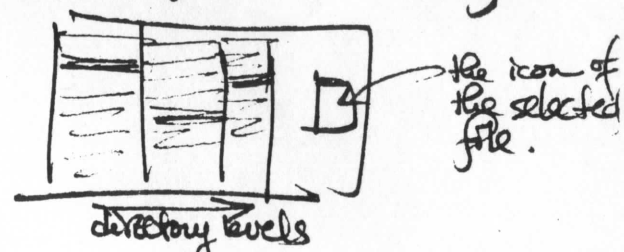
Jobs sits down and demos.

boot
login
The Workspace

- Menus
- Browser
- Icon doc

BROWSER

- We like icons but sometimes there are too many to show/find.
- Browser lets you traverse directory.



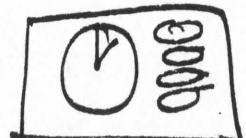
MENUS

⊖ Pulldowns don't want work on a large screen
⊖ Popups ⊖ users want to see top level
→ Tear off menus
multilevel popup

"Docks" – foreground place for icons. Can slide on/off screen

"Black hole" instead of trashcan. (Joke about Apple suit. "No trashcans here!")

STOPWATCH – written in an hour!



Multitasking demo: 4 simultaneously running stopwatches.

INTERFACE BUILDER

- Gas molecule in cylinder (piston)

Palette of radio buttons, buttons, sliders...

Connection box

Add Start, Stop, Reset button
Add sliders for Temp, Mass, Gravity

Strip chart recorder object
Add Sound button (thumps)

~~• Dr. Richard Crandall, Physics, Reed~~ College; NeXT Education Fellow

- Elementary Statistics Lab
- Molecule

- Link to Mathematica for the wave functions

- Real-time oscilloscope with his voice!
(Applause) (laughter) (whistles)
+ frequency analyzer

SOUND

Screen displays four photos. Click them to play sound.

Mountain Peaks	MLK
JFK	Astronaut Armstrong on Moon surface

Rain storm thunder

"I have a dream"

"Ask not" Peace Corps speech

"Eagle has landed"

Simultaneous
- pulling sound from disk
playing it
- •
- Graphics

MAILER

"Lip Service"
- lets you speak into microphone & send the digitized sound.

"The sound of one hand clapping" - 3D Ft Wave

THE DIGITAL LIBRARY

For Webster's 9th New Collegiate Dictionary + Thesaurus
Oxford Dictionary of Quotations
Complete Shakespeare

The First Good Digital Book: Webster's

Some say I'm.. "mercurial" – unpredictable, changeable, mood
Antonym → "saturnine" – gloomy, dourness, mood
"mercurial" doesn't sound so bad after all!

Technology – wonderful definition. The sum of all means for providing for people's ——— and comfort.

Dictionary includes pictures !!!
vivid detail.
(VRW, cones.)

Shakespeare
books + books – 5 examples

Quotations
breakfast — Lewis Carroll
"why, sometimes I've believed 6 impossible things before breakfast."

MUSIC Synthesis in real time from pure mathematics

- 1/10 of sec before you hear it's synthesized.

using 1/10 of total cpu throughput.

Demos
- string
- Gamelan
- Bullfight

Again – we raise the LCD.
Bundled with every system:

1. Mach OS
2. PS
3. NextStep dvmt envt
4. Sound & Music
5. Digital Library
6. WriteNow (WP)
7. Mail (compatible w/ dvmt mail)
8. Mathematica
9. SyBase — "best DB technology in the world"
10. Franz Allegro Common LISP
    - Most sought after by AI people.

PRICE

$6500 for all this!
(To higher ed)

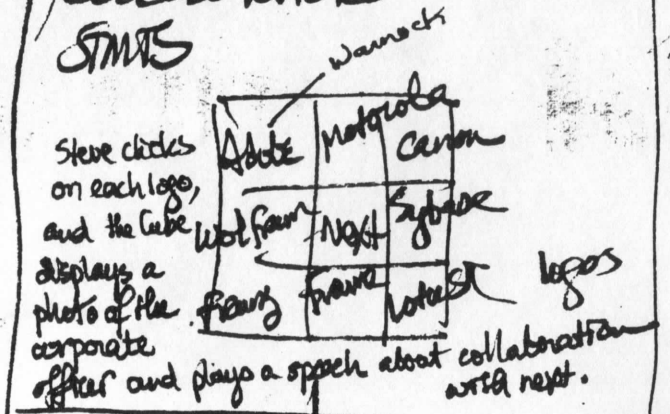
$2000 for the laser printer.

+ Winchester drives (optional)
330 MB $2000
660 MB $4000

AVAILABILITY

what	0.8	0.9	1.0
when	Q4	Q1	Q2
For (audience)	drvrs	drvrs + aggressive 3rd users	everyone!

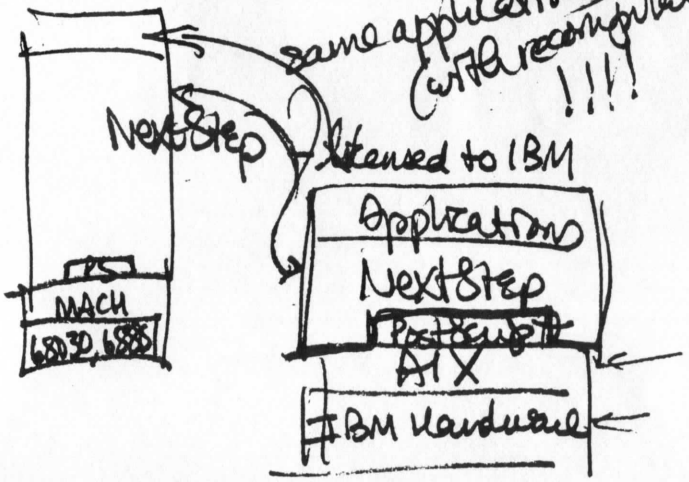
COLLABORATORS' STATS



Today-
An example of superb theatre.

Impression—
- Eye-opening innovations
- uncompromising quality
- design integrity

IBM!



Edwin Land, Polaroid
"∧ of Art & Science"

FINALE / DUET / Bach's A m violin concerto
by a NeXT box synthesizing keyboard
+ SF Symph Orch 2nd violinist — Love