Lucia Dossin - Thesis Notes

Chapter One

> This chapter will contain descriptions of each element in the interaction and will confront those definitions to the statements terms. By doing this, I intend to prepare the reader for my arguments in the next chapter.

In order to discuss the terminology around Human-Computer Interaction in the context of User Interface Design and the ongoing trend to 'upgrade' those terms, it seems wise to first define the terms which are being discussed: computer, user and interface. Static, dictionary-like definitions of the terms are certainly possible, but these usually do not cope with the historical dynamics that involve the terms and its meanings - which is essentialy important in this research.

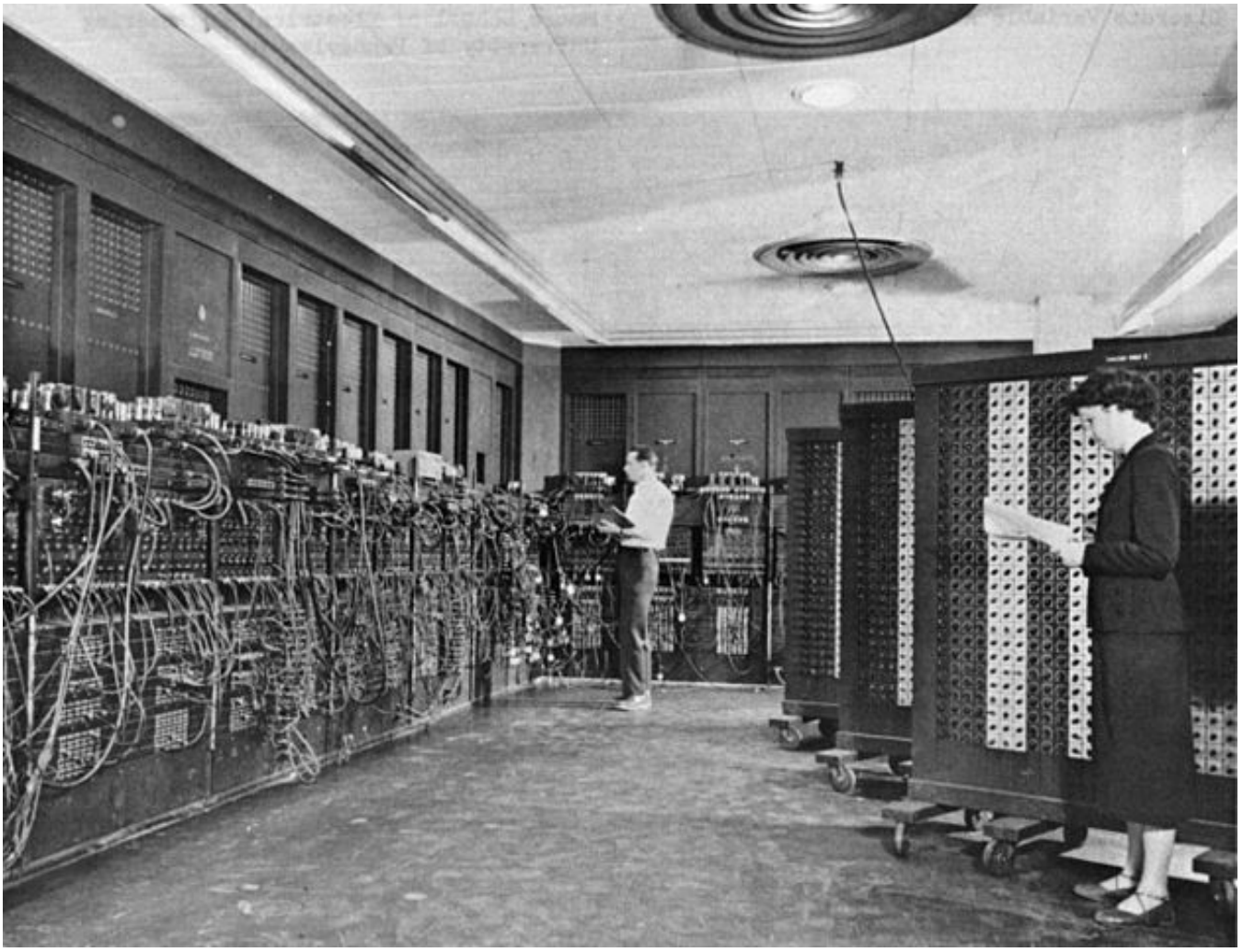
The development of computers has been an evolutionary process. Statements regarding the authorship of computer science and the definition of which was the first computer are controversial. It is not my goal in this research to question such statements, but to point moments in the history of computers which contain information that is relevant in the scope of this research.

The principle of the modern computer was described in 1936 by Alan Turing (On Computable Numbers, London Mathematical Society) but the use of tools for aiding computing and calculation dates back to 20.000 BC (https://en.wikipedia.org/wiki/Computer, accessed Feb 05, 2015). Even people could be called computers, when performing the task of computing and calculating. This episode - involving Radhanath Sickdha being promoted to 'chief computer' due to his good work in discovering the highest mountain in the world, in 1852, after 4 years of computing mathematical data - is a good example of change of meaning over time and the importance of the time frame regarding these definitions. (link retrieved at Hodges, Andrew - Alan Turing Internet Scrapbook, http://www.turing.org.uk/scrapbook/computer.html - accessed Feb 18, 2015) In the modern configuration, inaugurated by Turing, computer is a machine.

Within the interaction between humans and computers, each term of this interaction (user, computer, interface) is a component of a relationship. Therefore, the definition of one term strongly influences the others. By making snapshots of the terms descriptions through time, I hope to be able to portrait their definitions inside the relationship.

Snapshot #1 - ENIAC, 1946

ENIAC is the first electronic general-purpose computer. It was designed and built with financial support from the U.S. Army to be used with military purposes. It weighted more than 27ton and occupied 167m^2 (2.4 m × 0.9 m × 30 m). It used cards as input and output. 'The task of taking a problem and mapping it onto the machine was complex, and usually took weeks. After the program was figured out on paper, the process of getting the program into ENIAC by manipulating its switches and cables could take days. This was followed by a period of verification and debugging, aided by the ability to execute the program step by step.' (https://en.wikipedia.org/wiki/ENIAC, accessed Feb 18, 2015)



ENIAC by Unknown - U.S. Army Photo. Licensed under Public Domain via Wikimedia Commons.

Term	Description
Computer	Big dimensions, high cost, not industrially reproduced, requiring time and knowledge for operation. Cost: $500,000 (approximately $6,000,000 today)
User	Programmer (Six women did the most of ENIAC programming: Kay McNulty, Betty Jennings, Betty Snyder, Marlyn Wescoff, Fran Bilas and Ruth Lichterman)
Interface	Manipulation of switches and cables (program), card readers and punched cards (data input and output)

Snapshot #2 - Ferranti Mark I & the UNIVAC, 1951

Ferranti Mark I (UK) and the UNIVAC (USA) were the first commercial computers. Ferranti Mark I had 7 machines delivered (1951 - 1957), UNIVAC had 46. The first UNIVAC machine was delivered in 1951 for the United States Census Bureau. UNIVAC weighted 13ton and occupied 35.5 m^2 (4.3m × 2.4m × 2.6m). It was much smaller than ENIAC, and it also had a lower cost. (https://en.wikipedia.org/wiki/UNIVAC_I, https://en.wikipedia.org/wiki/Ferranti_Mark_1, acessed Feb 18, 2015)

Data is typed, by the Unitypist, using a keyboard and transfered to magnetic tapes. Alternatively, conversion between punched cards and magnetic tapes is also possible. The program is made by the programmer: a flowchart template, a pencil and paper are used to define the operations to be made. Then,

the operations are translated by the programmer into code sheets which in turn are recorded on tape by the Unitypist. The tape containing the program is mounted into the Uniservo. The Supervisory Control Unit is meant to allow the operator to have a continuous picture of the internal operations at any point in the process. It allows the operator to check for eventual inconsistencies found by the system and to manually make corrections in the program or in the dataset, whenever needed. The output is produced in printed form. (Remington-Rand presents the UNIVAC - advertisement video, acessed Feb 18, 2015)

A very detailed description regarding how the computer works and features related to checking data transcription and to allowing for direct and manual access to the system seem to be very important, as it can be seen in the ad presented above. Prospective buyers' trust still had to be conquered. Productivity gain alone was not enough for buyers to give away control over their tasks to the computer. Besides that, some degree of specific knowledge and/or training was required to operate the computer.

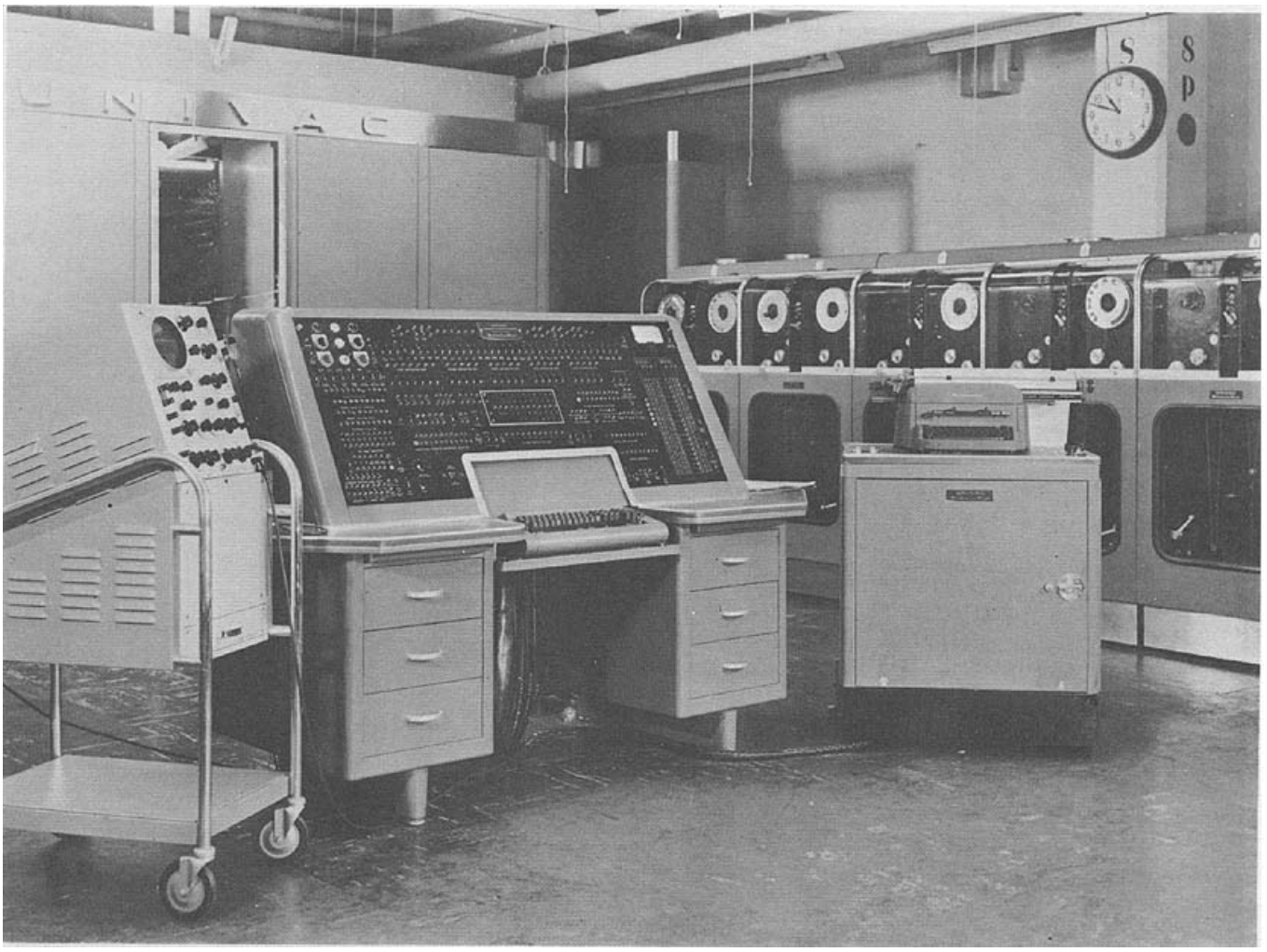


Photo by Wright-Patterson Air Force Base

Term	Description
Computer	Smaller dimensions, lower cost, not mass-produced, but sold commercially. Cost: $159,000 (the price rose through time though)
User(s)	Programmer (defines the operations to be done by the computer. The programmer is involved in the process, but his interaction is not physical. He does not directly interact with the machine.) Unitypist (transcribes data and programs to and from UNIVAC) Operator (checks eventual inconsistencies and fixes them)
Interface	Keyboard for typing and transcribing data, programs and corrections into magnetic tapes.

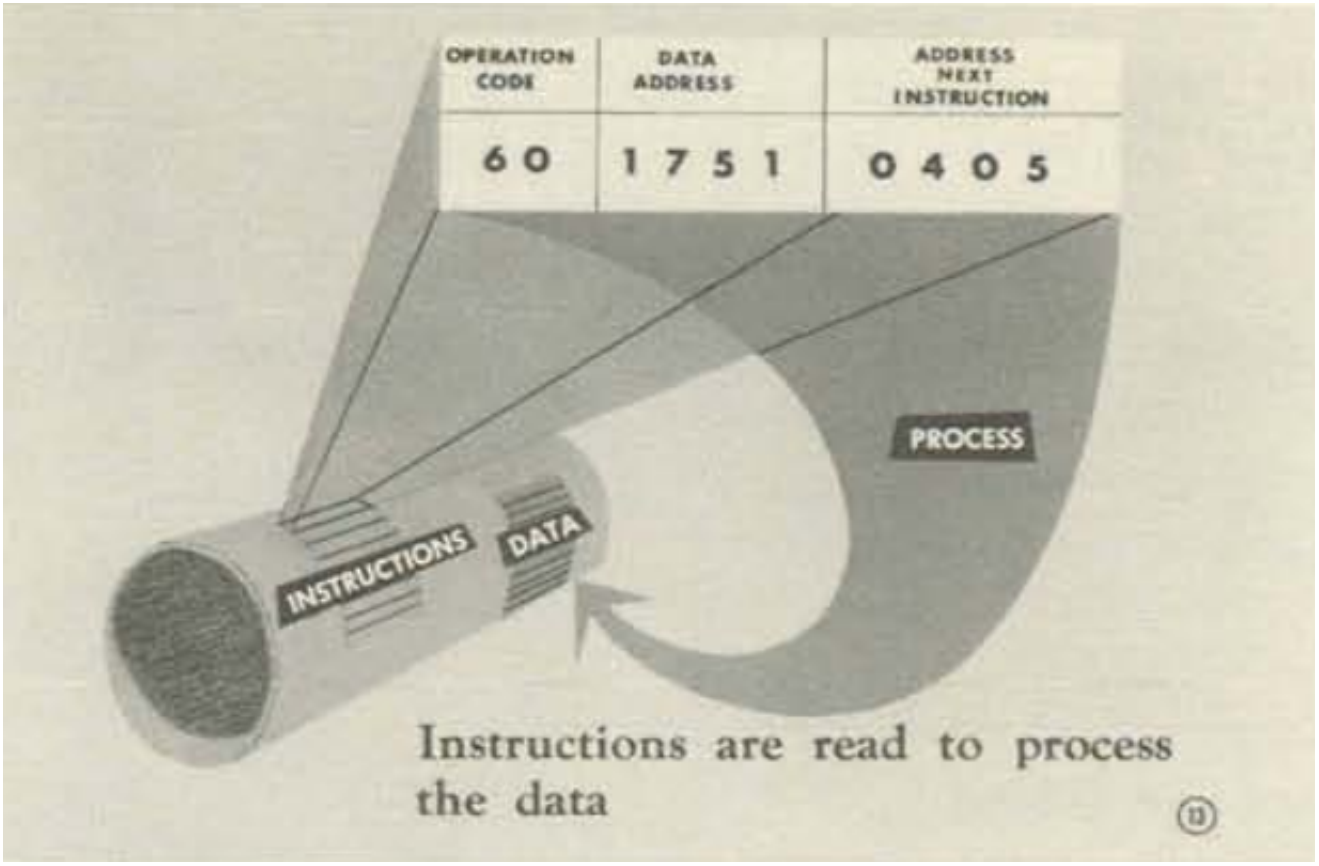
Snapshot #3 - IBM650, 1953

The IBM650 was the first mass-produced computer. Almost 2000 systems were produced. (https://en.wikipedia.org/wiki/IBM_650, accessed Feb 18, 2015)

IBM 650 at Texas A&M by Cushing Memorial Library and Archives, Texas A&M - Flickr: IBM Processing Machine. Licensed under CC BY 2.0 via Wikimedia Commons

The IBM650 Manual contains not only descriptive information, but also a quite detailed explanation on how to program for the machine. The program is made by the programmer, who analyses the problem to be solved, breaks it down into logical/arythmetic operations and translates the operation sequence into instructions that can be read and performed by the machine.

A group of instructions like the one illustrated below is a program. Programs are written on a planning chart and punched into cards. The Console is used to instruct the machine to start storing the program (from cards to drum). After the program has been stored, the data cards are placed into the input feed. The use of the Console again is needed, to instruct the machine to start retrieving/storing data.



Source: http://archive.computerhistory.org/resources/text/IBM/IBM.650.1955.102646125.pdf

Input and output units would convert alphabetical and special characters to/from a two-digit decimal code. 'Instructions are ten-digit numbers and, like data, are stored on the drum in individual locations; they are used by the machine to process data. Each instruction tells the machine the operation it is to perform, where on the drum it is to find the data involved in the operation and where on the drum it is to find the next instruction to be carried out. The instruction in the illustration tells the machine to add the data from location 1751 and to find the next instruction in location 0405.'(IBM presents The 650 Magnetic Drum Data Processing Machine, p.6)

The IBM 650 is considered the ancestor of the personal computer [gather sources]. Contrary to its predecessors, which were aimed mostly at large government agencies, the Magnetic Drum Machine was designed to be affordable and easy to use. It was cheap (and discounts for universities were possible), small (would fit in one room) and user-friendly (programmed in decimal rather than in binary). (Art Miller http://www.mta.ca/~amiller/ibm650/ibm650.htm, Columbia University http://www.columbia.edu/cu/computinghistory/650.html, acessed Feb 18, 2015) 'It weighed over 900 kg, the attached power supply weighed around 1350 kg and both were held in separate cabinets of roughly 1.5 meters by 0.9 meters by 1.8 meters. It cost $500.000.' (https://en.wikipedia.org/wiki/History_of_computing_hardware, accessed Feb 18, 2015)

Term	Description
Computer	Smaller dimensions, lower cost, mass-produced. The cost varied according to the modules/units purchased. The computer could also be rented on a monthly basis.
User(s)	Programmer
Interface	Punched cards and Console Unit. Programs are written in decimals, not binary

Snapshot #4 - Apple II, 1977

First successfull mass-produced personal computer (http://www.thocp.net/timeline, accessed Feb 18, 2015).

Apple II IMG 4212 by Rama. Licensed under CC BY-SA 2.0 fr via Wikimedia Commons

Ref
http://apple2history.org/history/ah04/
https://en.wikipedia.org/wiki/Apple_II
https://archive.org/stream/Personal_Computer_World_1978-08_Apple_II_Review#page/n0/mode/2up
http://archive.org/stream/byte-magazine-1977-05/1977_05_BYTE_02-05_Interfacing#page/n35/mode/2up

Red Book Manual
http://www.classiccmp.org/cini/pdf/Apple/Apple%20II%20%28Redbook%29%20Reference%20Manual%2030th%20Anniversary.pdf AND https://archive.org/details/applerefjan78

$1298 4K RAM
$2638 48K RAM

Snapshot #5 - Apple Lisa, 1982

High price ($4500), based on Xerox Alto, GUI. Failed.

Apple Lisa. Licensed under CC BY-SA 3.0 via Wikimedia Commons

Ref
GUI timeline http://toastytech.com/guis/guitimeline.html

The Art of Unix Usability
Chapter 2. History: A Brief History of User Interfaces
2004, Eric Steven Raymond and Rob W. Landley
(http://www.catb.org/~esr/writings/taouu/html/ch02s05.html accessed Feb 01, 2015)

The 'evolution' in the User Interface has been strongly related to the economical and technical viability of its implementation: reasonably fast, reasonably cheap computers, produced for mass consumption, on individual basis. Screen + mouse

> For reasonable update speed, graphics displays really need to be coupled more closely to the machine that is doing the rendering than a serial connection will allow. This is especially true if one needs to support the kind of high interactivity and frequently changing displays characteristic of games or GUIs; for this, only direct memory access will do. Thus, the invention of the GUI had to wait until developments in silicon integrated circuits dropped the cost of computing power enough that a capable processor could be associated with each display, and the combination had become sufficiently inexpensive that machines could be dedicated to individuals' use.

(from: The first GUIs)

> Cooperative multitasking was an economy measure. It meant the hardware platform could omit an expensive MMU (memory-management unit) from its parts list. On the other hand, it

> meant that the latency of interfaces was minimal and constant, never disturbed by random interrupts or scheduler-introduced jitter. This made for a smooth, predictable user experience even on relatively underpowered hardware. On the third hand, the absence of preemption turned into a serious liability as computers became more and more networked. It was literally the case that an entire network of Apple machines could be frozen by a user holding down a shift key at the wrong time!
>
> Despite this weakness, the Macintosh had an even larger impact on user-interface design than had the Alto, because it was not dismissable as a mere laboratory toy but rather a very successful consumer product. GUIs, it proved, could sell computers to the mass market. Microsoft and others in the personal-computer market scrambled to adapt.

(from: The first GUIs)

GUI's play a fundamental role in mass scale consumption of computers, since Apple improved XEROX PARC Alto's GUI design.

Snapshot #6 - Apple Macintosh, 1984

Based on Xerox Alto prototype and Apple Lisa, GUI, with a more affordable price.

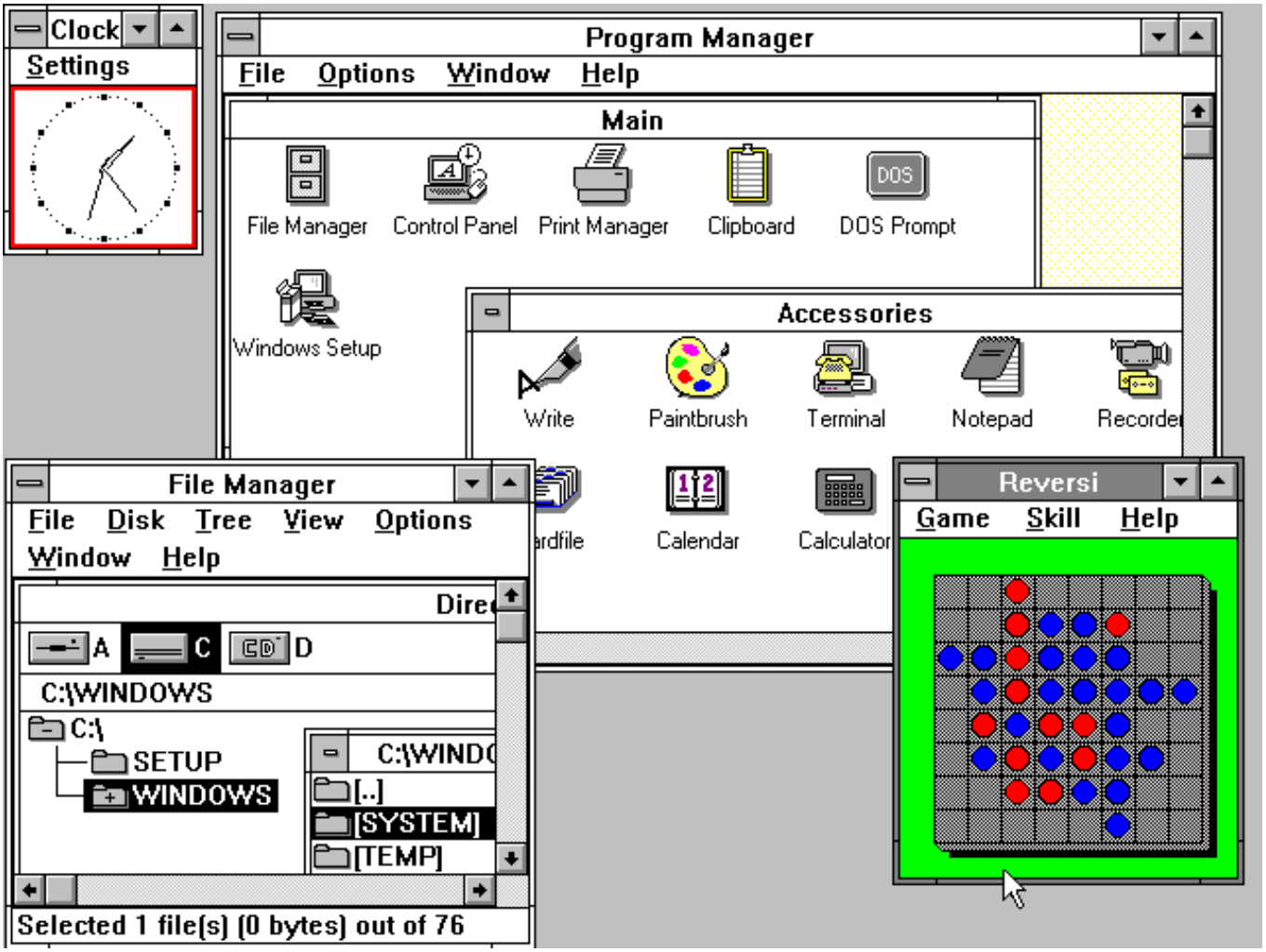
Macintosh 128k transparency by w:User:Grm wnr - Modifications of Image:Macintosh 128k.jpg and w:Image:Macintosh 128k No Text.jpg. Licensed under CC BY-SA 3.0 via Wikimedia Commons

Cost $298

Snapshot #7 - Windows3 PC's, 1989

Revamped GUI

-> X Windowing System, Windows gets the market (Windows 95), leaving Apple with niches.



Windows 3.0 workspace by Screenshot is taken and uploaded by Tyomitch (talk · contribs). Via Wikipedia

Ref
https://en.wikipedia.org/wiki/Windows_3.0
http://www.guidebookgallery.org/guis/windows/win30
http://www.oldcomputermuseum.com/os/windows_3.0.html
http://toastytech.com/guis/win30.html

Snapshot #8 - Apple OS X, 1996-1998

OS based on Unix, GUI.

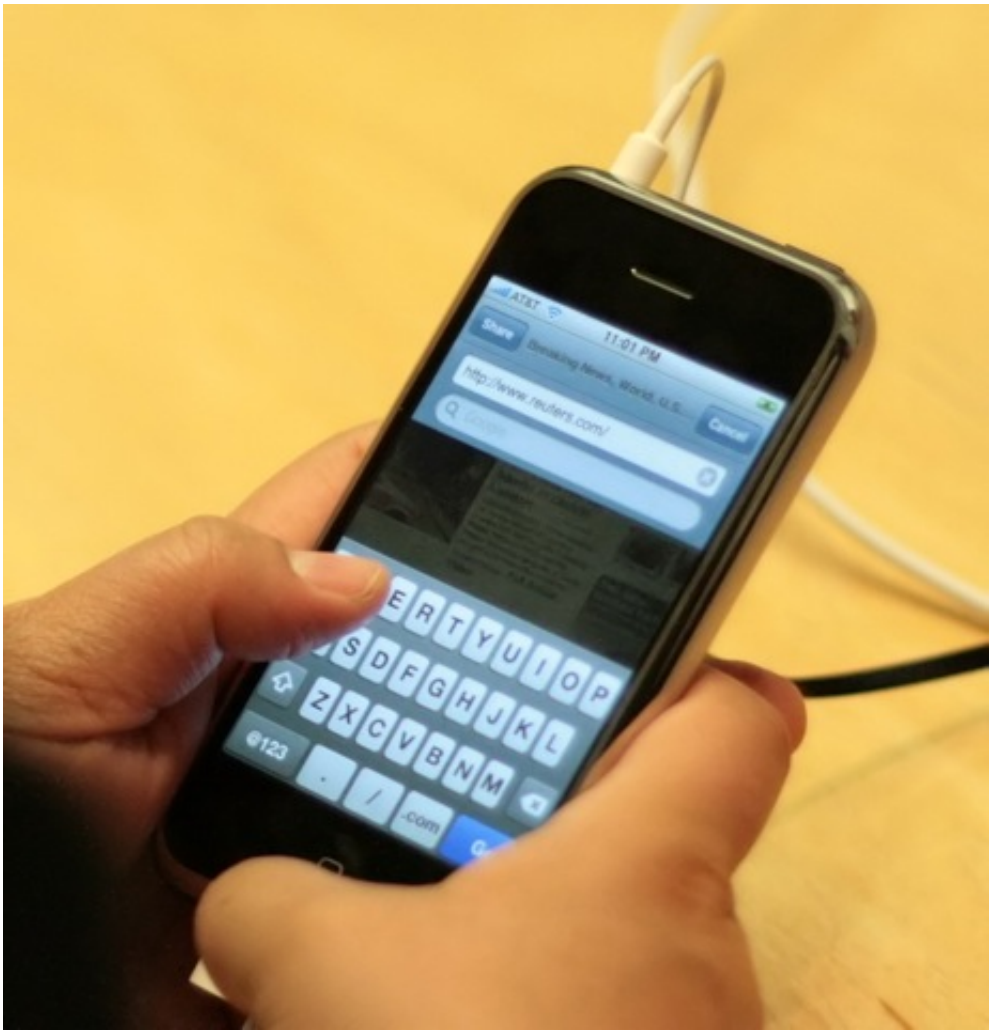
Source: http://toastytech.com/guis/osx.html

Ref
https://en.wikipedia.org/wiki/OS_X
http://toastytech.com/guis/rhap.html
http://toastytech.com/guis/osx.html

BUT, in 1996 - 1998:

> The 1996-1998 emergence of the open-source movement into public view shook up the computer industry as nothing had in the previous decade. The evolution of user interfaces was affected, along with everything else. Four particular events during those three years well expressed the trend:
>
> - The rapid eclipse of proprietary X toolkits (notably Motif) by the open-source GTK and Qt toolkits.
> - The launching of the GNOME and KDE projects to create Linux GUIs.
> - The embrace of open-source development by Andy Hertzfeld and other leading developers of the Macintosh interface.
> - Apple's adoption of an open-source Unix as the foundation of Mac OS X.
>
> The last two items, in particular, pointed at two different ways to reconcile the Unix community with the PARC/Macintosh mainstream of the GUI tradition.

Snapshot #9 - iPhone, 2007



IPhone keyboard unblurred by TakuyaMurata - Image:IPhone*Release-Seattle*(keyboard) cropped.jpg. Licensed under CC BY-SA 2.0 via Wikipedia

500 million sold by March 2014

Snapshot #10 - iPad, 2010

Apple has sold 170 million iPads since April 2010 (numbers from Oct 2013)

Reference

Weik, Martin H. (March 1961). A Third Survey of Domestic Electronic Digital Computing Systems (http://ed-thelen.org/comp-hist/BRL61.html#TOC, accessed Feb 18, 2015)

IBM presents The 650 Magnetic Drum Machine (http://archive.computerhistory.org/resources/text/IBM/IBM.650.1955.102646125.pdf, acessed Feb 18, 2015)

History of Computing, editors unkonwn (http://www.thocp.net/timeline, acessed Feb 18, 2015)