

The Museum of Computer History as teaching support for computer organization subjects



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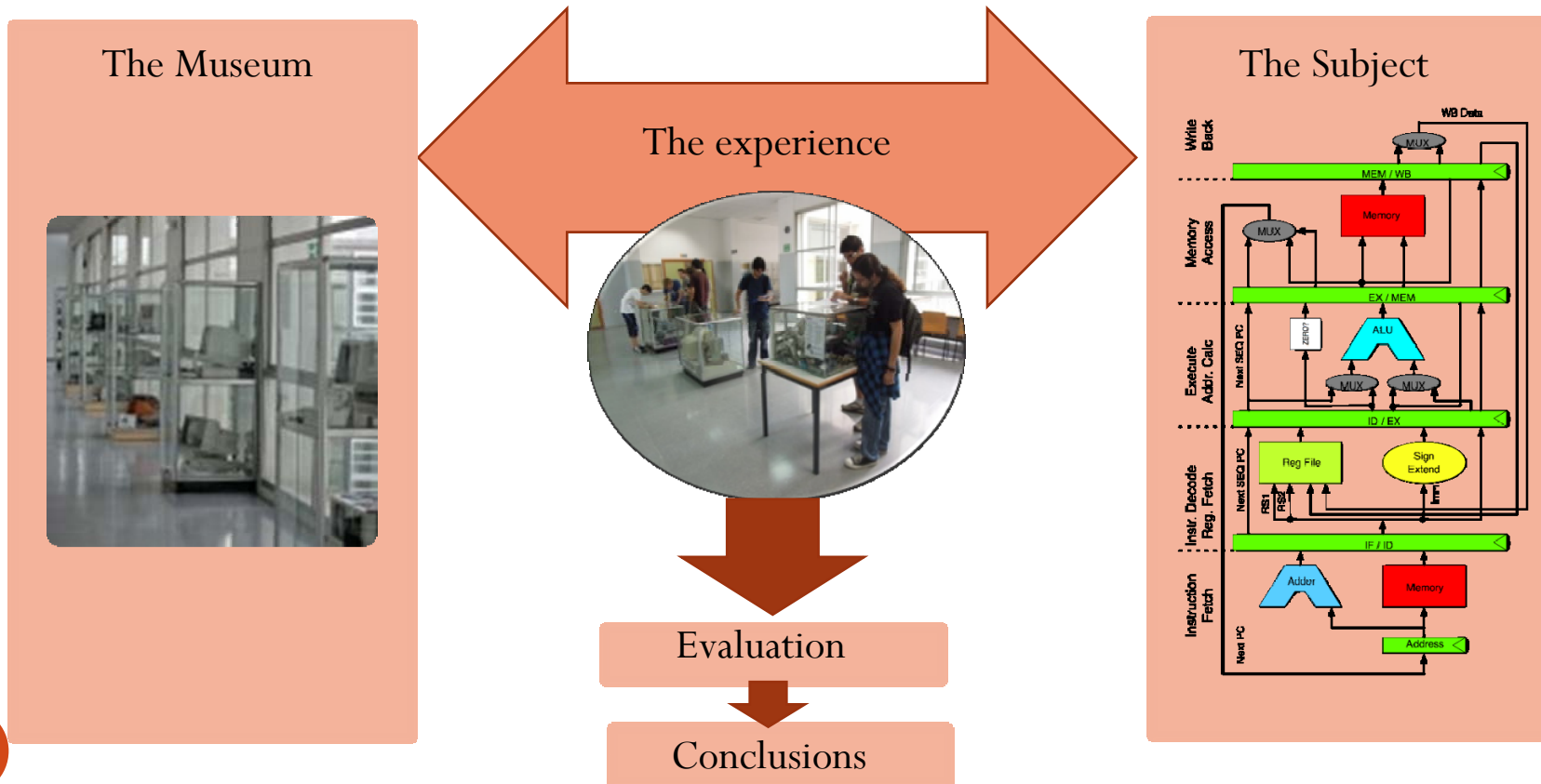
School of Informatics

Universitat Politècnica de València



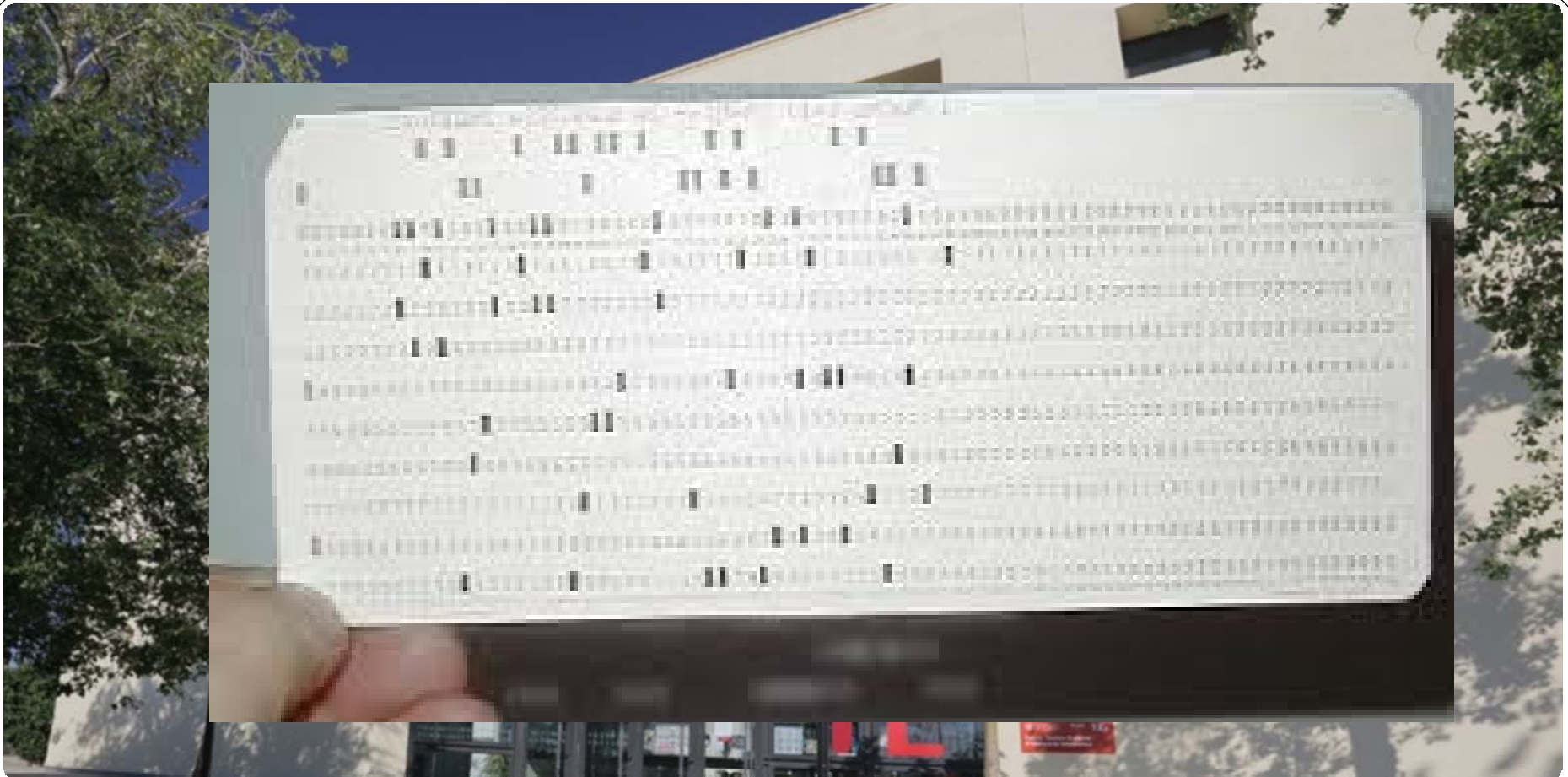
Escola Tècnica
Superior d'Enginyeria
Informàtica

How the Museum of Computer History has become an additional activity of the Computer Organization subject with the main objective of increasing the student motivation and to spread the history of computers





The Museum of Computer History



The Museum of Computer History

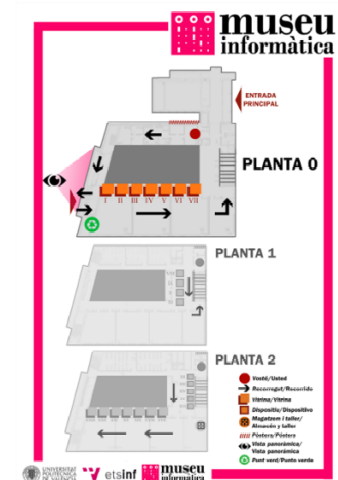
The Museum of Computer History

- Inaugurated in 2001
 - It becomes in an official Museum in 2013
- Located at the School of Informatics the Universitat Politècnica de València (Spain)
- It's a patrimonial diffusion project
 - aimed at young students and also at public in general
- Main objectives:
 - to spread the history of computers
 - to encourage critical reflection about social and environmental computer related issues



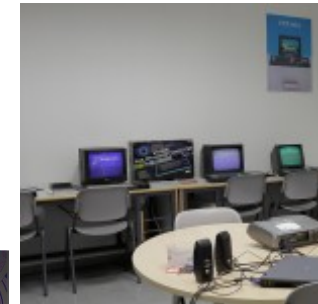
The Museum of Computer History

- It's arranged over three floors in one of the buildings
- Permanent exhibition organized into a set of showcases and informative panels
- Web site: museo.inf.upv.es
(Spanish/Catalan official languages)



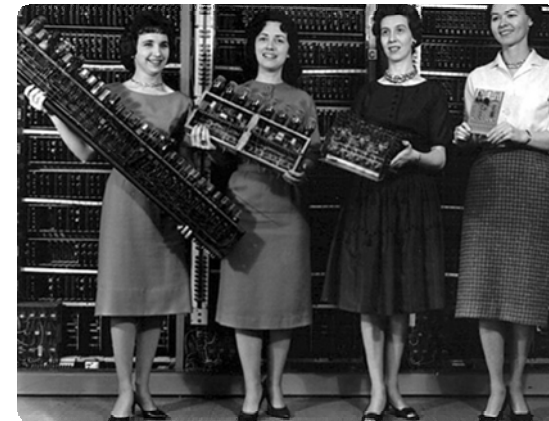
The Museum of Computer History

- Within the museum a wide range of educational and cultural activities are organized:
 - Guided tours
 - Workshops (and also game workshops) with old computers
 - Retro programming courses (**Live Museum**)
 - Competitions
 - Series of movies



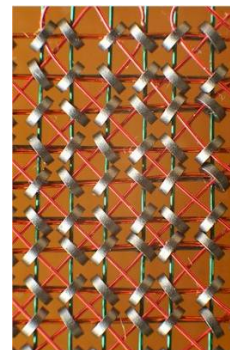
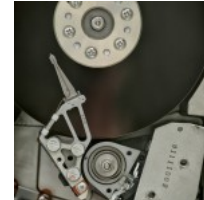
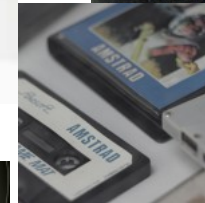
Permanent exhibition

- Last three decades of the XX century
- Chronological exhibition criteria
- Donations
- Glass showcases: objects and placards
 - Put them into context (names, purpose)
 - Include software and complementary devices when possible
 - Ecological issues
- Informative panels
 - History, programming, languages, ...
 - Women in computing, publicity



Collection and curiosities

- Card puncher
- Ferrite core memories
- Minicomputers
- Microcomputers
- First portable computers
- Workstations
- Video games





The Subject
Computer Organization

Computer Organization

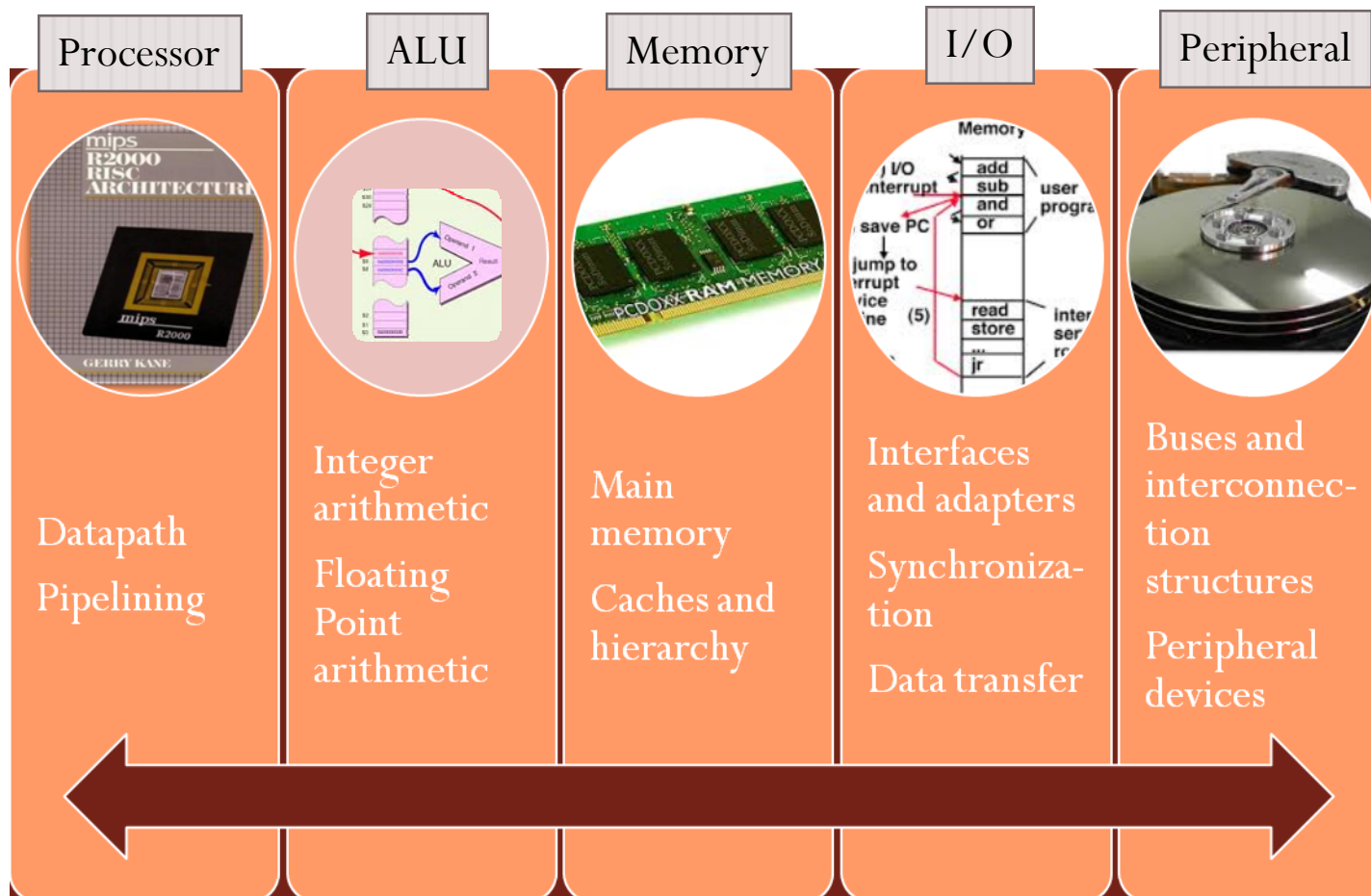
- Second year core subject for the Degree of Computer Engineering at the UPV
- Students aged 19-20
- 9 ECTS (6 in classroom, 3 in lab)
- Academic year 2013-14:
 - 425 Students, 7 teachers, 7 classroom groups
 - 6 groups morning time, one evening time
- Academic success rate 62% (2013-14)



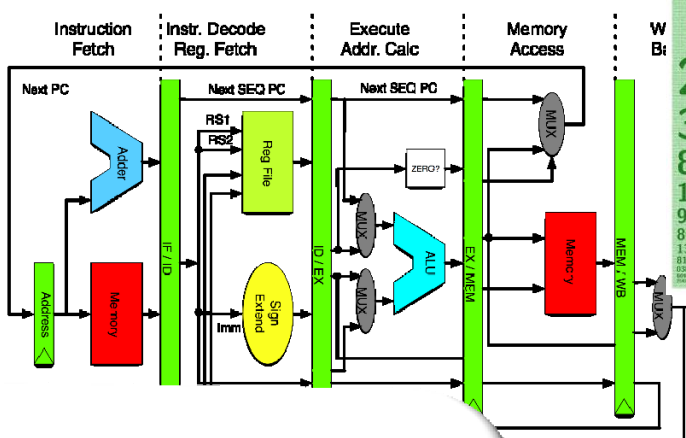
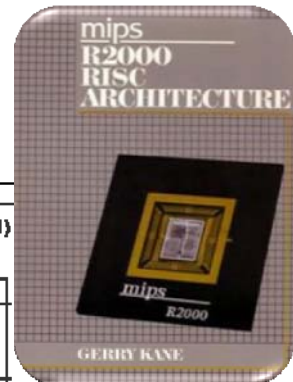
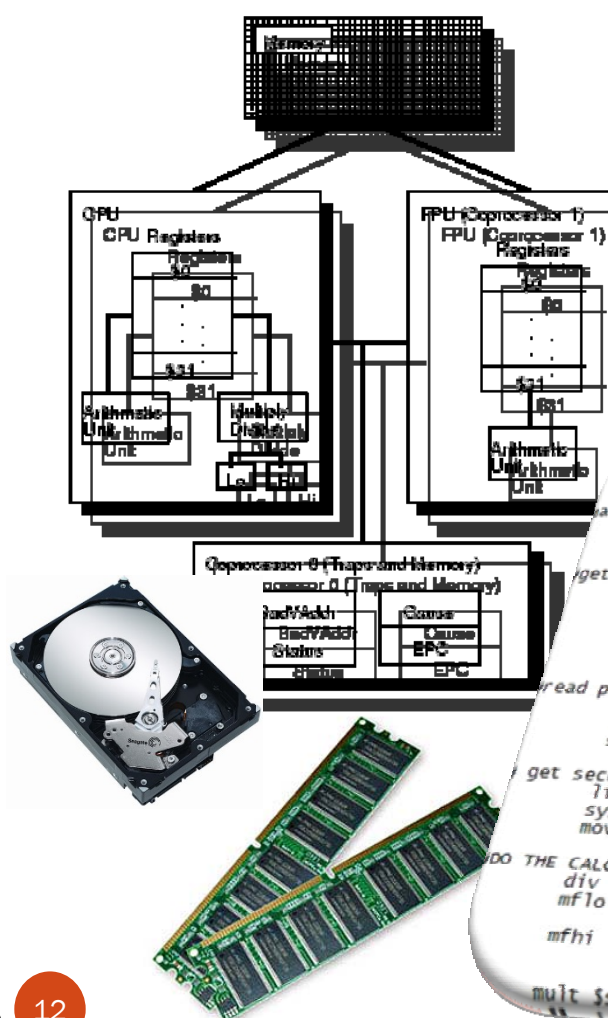
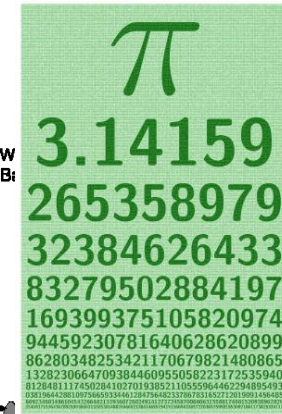
Objective

To introduce the main concepts and components of computer structure and architecture both from quantitatively and qualitatively point of view

Which are the main topics?



MIPS R2000 is taken as example.
 This processor and its assembly language is the base for explaining.



```

main:  li $v0, 4          # system call code for print_string
      la $a0, str1       # address of str1
      syscall            # print str1

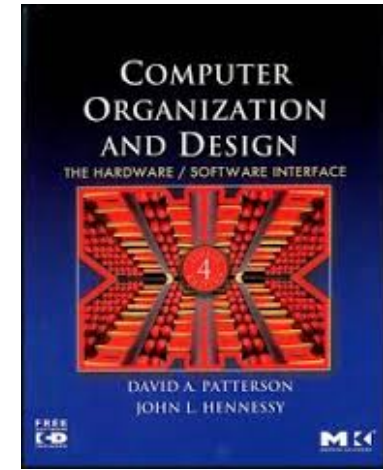
get the first number from user, put it into $s0
      li $v0, 5          # system call code for read_int
      syscall            # read an integer into $v0 from console
      add $s0, $v0, $zero # copy $v0 into $s0 (a)

read print_string for str2
      li $v0, 4          # system call code for print_string
      la $a0, str2       # address of str1
      syscall            # print str1

get second number from user, put it into $t1
      li $v0, 5          # load syscall for read_int
      syscall            # make the syscall
      move $s1, $v0      # move the number read into $s1(b)

DO THE CALCULATIONS.....
      div $s0, $s1       # dividing $s0 by $s1
      mflo $t0           # storing value of lo(quotient) in
                        # register $t0
      mfhi $t1           # storing value of hi(remainder) in
                        # register $t1

      mult $s0, $s1
  
```





The Experience

Why the experience?

- Twofold objective

- To motivate our students and make easier to them the understanding of Computer Organization and Computer Architecture subjects.
- To increase the technological culture of our students through the knowledge of computer history and evolution.

- Organization

- 6 professors and 269 students
- 2 turns
- Beginning of the academic year
- 2 hours length
 - Introductory lecture
 - Movies
 - Tour



Lecture and films

- Lecture
 - Historical perspective of computers
 - Sociological and environmental aspects involved
- Documentary: early stages of computers and programming
- '80s TV spots and commercials
 - Link with the permanent exhibition



Self-guided visit

- How to ?
 - Keep the interest in the visit
 - Complete the tour
- Questionnaires
 - Battery of 100 questions
 - Tipus A, B, C, D
 - 22 questions/questionnaire
 - Where to look for?
 - Movies
 - Lecture
 - Informative panels
 - Professors
 - Of course, Internet



Computer Organization

Visit to the Museum of Computer History

Group	
First Name	
Last Name	

Questions

With what type of technology Charles Babbage designed his Analytic Machine?	
With what technology Konrad Zuse built his Z1 machine on 1938?	
Who synthesized in 1945 the basic components that any programmable computer should have?	
How many kg does the HP 3121D storage unit based on floppy disks weight?	
What is the name of the word processor that formed part of the software distributed with the Amstrad PCW-8256 computer?	
How many plates had the IBM 105R device (DASD, direct access storage device)?	
What type of interface have in common the storage systems of the HP Apollo Series 700 and SGI Indigo2 IMPACTTM workstations?	
What means that the IBM PC had an open architecture?	
What was the first computer built using the stored-program concept?	





Visitor's book



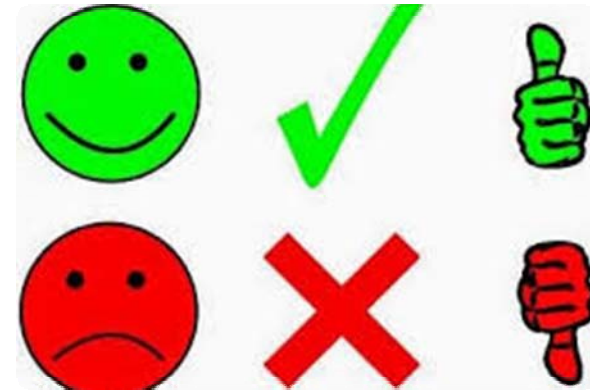
Evaluation

Evaluation

- Questionnaire correction

- 95% answers correct

- Poor handwriting, frugality, literal transcriptions



- Anonymous satisfaction survey

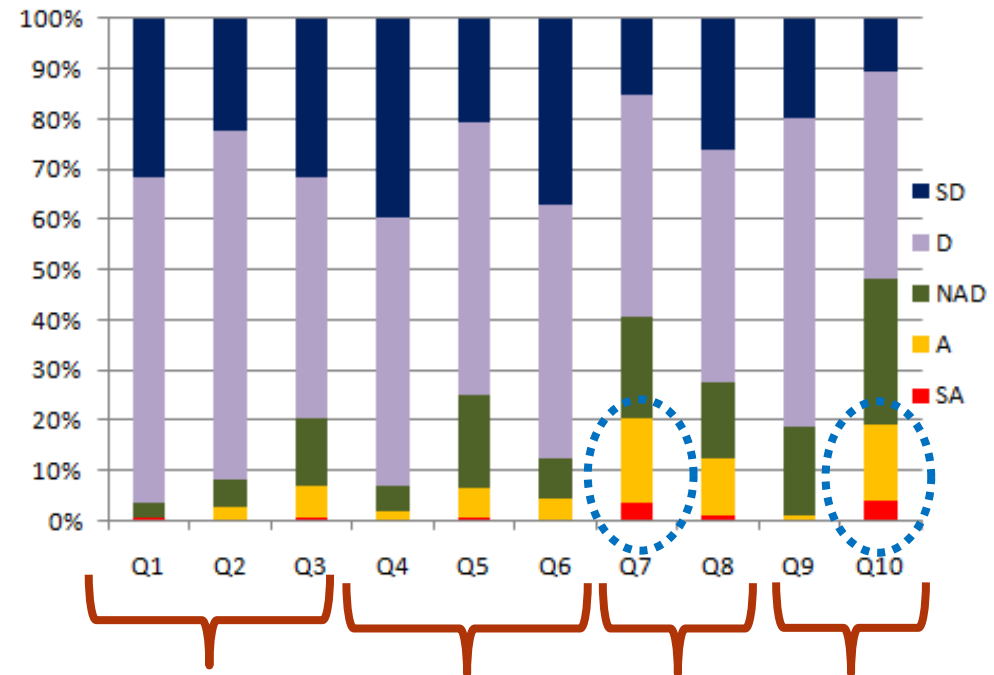
- Attendance validation

- 200 surveys processed (75%)

- 4 dimensions, 10 questions



Dimension 1: Activities before the visit	
Q1	<i>The conference prior to the Museum visit has helped me to discover computer science issues that I ignored</i>
Q2	<i>I found attractive and informative the documentary movie about the history of computers</i>
Q3	<i>Videos helped me to contextualize the exhibits</i>
Dimension 2: Visit to the Museum	
Q4	<i>I found interesting the contents of the Museum</i>
Q5	<i>Some of the components, devices and computers exhibited by the Museum aroused my curiosity</i>
Q6	<i>The visit has helped me to compare the current computers usages with respect to the past</i>
Dimension 3: Experience organization	
Q7	<i>The way the visit has been organized and conducted seems to me appropriate</i>
Q8	<i>The questionnaire filled out after the visit helped me to appreciate details that otherwise would have gone unnoticed to me</i>
Dimension 4: Overall evaluation	
Q9	<i>I would recommend this experience to other students</i>
Q10	<i>I consider that the Museum visit has motivated me to study the Computer Organization subject</i>



Visit in evening time!!

Conclusions

- Computer History Museum is a valuable tool to motivate our students
- Complex organization for a high number of students
 - Many resources involved
- Very positive experience
 - Need to improve materials and scheduling
- A pro-active attitude is needed from students side





If you have any question, please don't hesitate to ask.

