



**The Abdus Salam  
International Centre for Theoretical Physics**



**2273-2**

**Second Workshop on Open Source and the Internet for Building Global  
Scientific Communities with Emphasis on Environmental Monitoring and  
Distributed Instrumentation**

*28 November - 16 December, 2011*

**Introduction to Workshop**

U. Raich  
*CERN, Geneva  
Switzerland*



# Introduction to the College



Ulrich (Uli) Raich  
CERN BE department  
Beam Instrumentation Group

# Long time ago...



 INTERNATIONAL ATOMIC ENERGY AGENCY  
AND  
UNITED NATIONS EDUCATIONAL SCIENTIFIC  
AND CULTURAL ORGANIZATION 

INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

**COLLEGE ON MICROPROCESSORS  
TECHNOLOGY AND APPLICATIONS IN PHYSICS**

MIRAMARE-TRIESTE, ITALY  
7 September – 2 October 1981

During the last few years the scientific community has been facing a very rapid development in the technology and applications of microprocessors. Moreover, their price has dropped to such a low level, that their acquisition and utilization is now possible also for small universities and research centres.

There is, therefore, an urgent need to disseminate knowledge about the present state of the technology of microprocessors and their scientific applications throughout the scientific community of developing countries.

The International Centre for Theoretical Physics, Trieste, will hold a College on Microprocessors, covering both their technology and their applications in physics, from 7 September to 2 October 1981. The College will be directed by Professor A. van Dam (Brown University, Providence, U.S.A.), Mr. C. Verkerk and Dr. P. Zanella (CERN, Geneva, Switzerland).

In physics research, microprocessors can be used as:

a) low cost, intelligent devices to control instruments and

# 30 years at the ICTP



End seventies: Arrival of 8 bit micro-processors

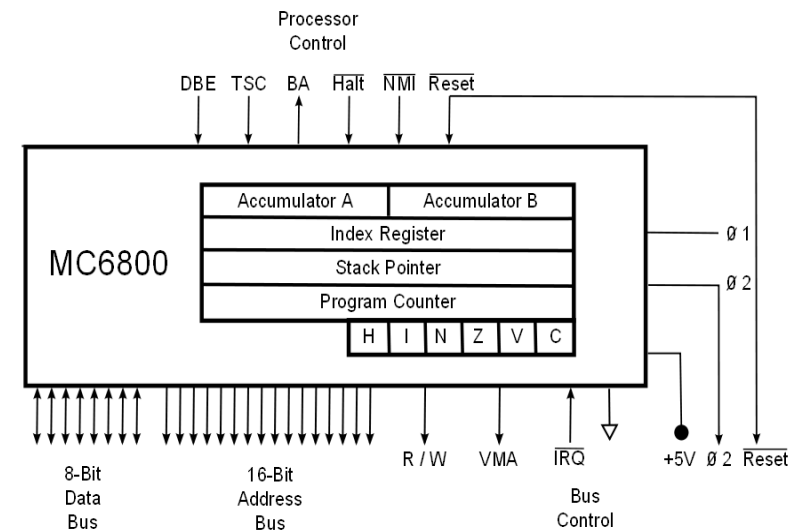
Change for developing countries to enter the game?

- Processor chips are cheap (tens of US\$)
- Programmed in assembly code (can be hand translated)
- 1024 bytes of ROM
- A whopping 128 bytes of RAM!

# The first course



- Writing program (on paper)
- Translate by hand using a table
- Edit program on CDC mainframe in Trieste
- Connection through 300 baud telephone line



# The Computer at Work



## The Digital Equipment Corporation PDP-11

- A mini-computer with 128 kBytes of RAM
- 2 Harddisks of 5 Mbytes each
- DEC tape
- First Unix operating system ran on PDP-11
- Was used to control the whole linear accelerator



# ROSY



- Home build **R**esident **O**perating **S**ystem allows debugging on the target machine
- Rosy junior contains flex operating system on floppy disks. Now local assembler on the target system





# Linux and Networks



~1990: arrival of Linux

- First system we used was loaded from 40 floppy disks!
- Shift to high level languages (C, later Java)
- Networked system with PC console and M6809/M6811 micro-processors connect via serial lines





# How the course could live so long



- Constant adaptation to modern technology
- Lecturers coming from University, research institutes and industry with very different cultural and social background dedicated to a common goal
- Dedication of lecturers and a big investment in time
- The structure of the course
- Finally: YOU!

# The TINI and Java



- The Dallas TINI embedded system had a Java virtual machine on board and allowed programming in Java
- Tini did sensor access
- Comfortable Java GUI to provide user interface to the whole system

# Today's Course Hardware



- PC for cross compilation
- Small embedded systems with SOC (system on a chip) micro-controllers. Cost : a few Euros.
- Medium size embedded system  
(The medium size embedded system for ~80 Euros is quite a bit more powerful than the PDP-11 mini computer.
- Medium size embedded system run Linux kernels

# Course structure



- Formal lectures in the morning
  - Don't hesitate to ask questions during the lectures
  - The lecturers are available for questions during coffee break etc.
- Exercises in the afternoon
  - This tells you (and us) what you have understood and where you have problems
  - Ideal time to ask even more questions

# Good luck



We hope you will all profit from the course

We expect you to work hard but we think that  
the course is also fun