

Computer Labs: Project – Specification

2º MIEIC

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Project Specification

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Project Specification

- ▶ A document with up to 5 pages containing:
 - ▶ The information you should have provided in the proposal, possibly more detailed:
 - ▶ Description of the project - is it a game, an editor, ... ?
 - ▶ Identification of the devices used and their role in the program
 - ▶ Information regarding the use of each device
 - ▶ A list of the modules that you believe you'll have to implement
 - ▶ A development plan

Per Device Information

- ▶ Which functionality/features do you plan to use
- ▶ Which operating mode (polling vs. interrupts)
- ▶ What will be done in assembly code, if anything

Modules

- ▶ For sure, one per device (may be you can have a single module for the keyboard and the mouse)
- ▶ Other modules will depend on the project. Possible modules:
 - ▶ Dispatcher, which processes events and invokes the corresponding handlers
 - ▶ Graphics module
 - ▶ Menu module
 - ▶ Sound/music module
 - ▶ Program logic
 - ▶ Serial port protocol
 - ▶ Timers module

Plan

- ▶ The previous sections described the what, this will describe the:

When?

Who?

- ▶ Each module must have one student that is responsible for it
 - ▶ You must specify who did what in the final report
- ▶ For now plan it at the granularity of a module
 - ▶ It would be nice if you detailed it as you go along
- ▶ Be realistic.
 - ▶ The de facto deadline is 2015

But, you need to be aware of the 90-10 rule:

- ▶ 10% of the work takes 90% of the time
 - ▶ The remaining 90% take ... 90% of the time

So, the bottom line is, implementing takes at least twice as much as we expect

- ▶ Remember: the demo on the last lab class is worth 5%
- ▶ Be aware that the lab will not be open during Xmas break

Possible Paths

Bottom Up

- ▶ Complete the functionalities that you'll need from each device
- ▶ Be aware of differences between the VM and “bare metal”
 - ▶ The speaker usually does not work on VMs
 - ▶ The capabilities of the graphics card, or their configuration, may be different
 - ▶ Initialize the color palette (VBE – you'll get points)
 - ▶ Use a direct color mode supported by bot environments
 - ▶ Serial port emulation is a bit iffy (specially with interrupts)

Top Down

- ▶ May be not that suited for this course

Both

- ▶ One member starts in the bottom and the other in the top, and meet somewhere in the middle

Whichever

- ▶ Test thoroughly as you develop

Grading

- ▶ Project specification is 5% of the project grade
 - ▶ We will apply its own difficulty/originality factor

Difficulty Factor

- ▶ number, type and features used of I/O devices
- ▶ the techniques used
 - ▶ interrupt vs. polling
 - ▶ application-independent handlers
 - ▶ events (to handle asynchrony)
 - ▶ state machines
- ▶ use and extent of assembly programming
- ▶ computer graphics (not as relevant)
 - ▶ use of modes different from the ones in labs 1 or 2
 - ▶ double buffering
 - ▶ animation
 - ▶ collision detection

Originality Factor

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Additional Devices

- ▶ For project grades above 80% (16/20) you are required to use:
 - ▶ RTC - Real-Time Counter
 - ▶ UART - Serial port communication
- ▶ We will cover these devices in the next two lectures (one per lecture)
 - ▶ Grading of the specification will not consider them
- ▶ Nevertheless, if you plan to use them, you are advised to try to include them also in your specification:
 - ▶ Of course, we do not expect you to be as detailed
 - ▶ In spite of all the limitations, your plan will be more realistic

The Real Time Clock (RTC)

- ▶ Integrated circuit that maintains:
 - ▶ The date and
 - ▶ The time of the dayeven when the PC is switched-off and unplugged
- ▶ In addition, it:
 - ▶ Includes alarm functionality and can generate interrupts at specified times of the day;
 - ▶ Can generate interrupts periodically
 - ▶ Includes at least 50 non-volatile one-byte registers, which are usually used by the BIOS to store PC's configuration

Serial Port (UART)

- ▶ Akin to a network card, i.e. it allows communication between PCs
- ▶ But:
 - ▶ Only, point-to-point, i.e. between two PCs
 - ▶ Much slower (forget about sending video using the UART)

Final Project Grading (1/2) (From 1st lecture)

Execution: 45% + 5%

- ▶ 5% for demo in the last lab class

Code: 20%

- ▶ Structure and Modularity
- ▶ Documentation (use Doxygen)
- ▶ Readability
 - ▶ Names and comments
 - ▶ Indentation
- ▶ Compilation warnings

Final Report: 20%

- ▶ Summary of what is and what is not implemented;
- ▶ Usage instructions (with images)
- ▶ Description of the program's architecture
- ▶ **Relevant** aspects about the implementation
- ▶ Function call diagram

Tools: 5% (SVN) (We expect you to update the SVN repository at least once a week.)

Project Specification: 5%

Final Project Grading (2/2) (From 1st lecture)

- ▶ To the grade obtained by applying the above criteria, we'll apply:

Difficulty Factor

- ▶ Several aspects
 - ▶ number and type of I/O devices
 - ▶ features used of the I/O devices
 - ▶ the techniques used (interrupt vs. polling)
 - ▶ use and extent of assembly programming

Originality Factor

Marketing Bonus

- ▶ of 1 valor for the participation in the Semana Profissão Engenheiro (SPE), sometime in March 2015
 - ▶ These students often become monitors in following years
- ▶ In recent years, we have selected about 3 projects per year