Programació Conscient de l'Arquitectura (PCA)
Final Project
2010-2011-2q

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Final Project Objective

- ▶ Apply the optimizations techniques used in the course to reduce the execution time of a real program.
    - ▶ Use of an optimization methodology
    - ▶ Use of tools
    - ▶ Implement and evaluation of optimizations

Final Project Statement

- ▶ Optimize a video `mpeg2` files encoder
  - ▶ Original code from *MPEG Software Simulation Group*
  - ▶ The video encoder generates a `mpeg` file using
    - ▶ A configuration file (`.par` file)
    - ▶ Three files per video frame
- ▶ Files of the final project
  - ▶ Source code of the encoder and decoder
  - ▶ Kiss video (`.mpg` and `.par` files)
  - ▶ Tigre video (`.mpg` and `.par` files)

Environment Setup (I)

- ▶ Uncompress the source code
  - ▶ `tar -xzf mpeg2vidcodec_v12.tar.gz`
- ▶ Compile the encoder and decoder programs
  - ▶ `cd mpeg2/src/mpeg2dec/ ; make ; cd ../../..`
  - ▶ `cd mpeg2/src/mpeg2enc/ ; make ; cd ../../..`
- ▶ Copy mpg files to a subdirectory and change directory to it
- ▶ Run the decode once for each video in order to obtain the entry files that the encoder needs
  - ▶ `../mpeg2/src/mpeg2dec/mpeg2decode -q -f -b f.mpg -o0 new%d`
- ▶ Now, you can run the encoder
  - ▶ **THIS is the program you have to optimize**
  - ▶ `../mpeg2/src/mpeg2enc/mpeg2encode f.par f.m2v`
  - ▶ The output file and the original one MAY BE LIGHTLY DIFFERENTS (sound, FP precission,...)

Environment Setup (II)

- ▶ Hardware:
    - ▶ You can use any machine you have access
        - ▶ Laboratory machines
        - ▶ Personal machine
        - ▶ Also, you can compare the optimization impacts on different platforms
- ▶ Software
    - ▶ C Compiler
    - ▶ You need a mpeg player
        - ▶ On the lab you may find `mplayer`

Comments

- ▶ On the FIB machines those programs are installed
  - ▶ So, be careful you are running your local programs!
- ▶ It is possible that the output file varies once you are applying optimizations
  - ▶ Reason: floating point precision
  - ▶ It is not a problem if the quality of the video is similar to the original one
- ▶ Be careful with the power energy on the laptops
- ▶ During your correctness tests of your optimizations, you can modify the "number of frames" field on the .par file to reduce the number of frames to process

Final Project Deliverable

- ▶ Maximum number of pages: 15
- ▶ Contents :
  - ▶ Author Names
  - ▶ Description of the optimization methodology used
    - ▶ Automatization Scripts, Tests used,...
  - ▶ Experimental setup used
    - ▶ Hardware and software
  - ▶ Indicate the oringal code performance
    - ▶ Compiled with O3
  - ▶ Analyze different optimizations
    - ▶ Speedup, justifications, figures, ...
  - ▶ Conclusions
    - ▶ Final Speed-up , more significant optimizations,...

Some Details

- ▶ Final project should be done in couples
    - ▶ If the group is of 3 persons, we will more stricts
- ▶ Deadline: 13th June 23:59 on the RACO
- ▶ RACO
    - ▶ Files to submit
        - ▶ .pdf File with the report of maximum 15 pages
        - ▶ .zip File with the source of the different optimizations
        - ▶ .zip File with all the scripts used to measuer the execution time, check results, etc.

How long should the final project take you?

- ▶ As we are not looking a speed-up objective, we give you an estimation time to spend on the final project:
  - ▶ 20-25 hours **by student**
  - ▶ But you can work more :-)
- ▶ Take profit of all the hours you have to optimize the final project

Evaluation

- ► 40% of the Final Mark
- ► Some point that will be evaluated
  - ► The way you use the optimization methodology
  - ► The way you justify the optimizations done
    - ► Exploring the design space (i.e: unrolling degree)
    - ► Justification of the results
  - ► The final speedup is important but not the only factor to be considered
    - ► For instance: Decribe optimizations that you thought but that they didn't improve the code
  - ► Format of the report:
    - ► Structure, clarity, figures and results, ...
- ► We may ask a group to have a personal interview if we think it is necessary
- ► Copies will be 0 for all the students involved on the copy (Destination and source)

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