2019 MSOC Final Project

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2019/5/10

Part 1 SoC optimization 25%

- System optimization on ZedBoard
- Presentation

Image Denoise system

In the final project, we have to design a denoise system. You have to read a video into your system, denoise, and finally store it. Except for cache of the PS, you can do anything to accelerate this system to match the common frame rate of 30 frame per second (FPS). A noisy video (STEFAN.Y) is a video with ”salt & pepper” noise as shown in Fig.1, and we usually eliminate such noise by ”median filter”. Here, we have to execute a 3×3 block median filter, which the output of each block will be its median value. Fig.2 is an example of median filter, and Fig.3 is a result of it.

Image Denoise system

Figure 1: STEFAB.Y with noise

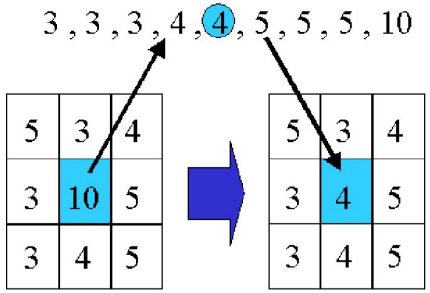


Figure 2: Median filter

Figure 3: Denoised STEFAN

Baseline

Our system consists of only one Zynq processing system, note that some ports/interfaces have been removed, remember to enable them if you need them. The system read the noisy video from SD card, denoise it with plain C code on CPU, then writes the processed video back to the SD card. The provided software also computes the FPS, which primarily determines your score. The only requirement of this project is that the **cache should be disabled**. You can do anything to make your system achieving the desired frame rate.

Tips

- IP wise:
  - Pipeline, Parallism
  - Interface, DMA
  - **Buffer design**
  - **HLS**
- **System wise**:
  - **Spot the bottlenecks**
- Algorithm wise:
  - efficient median filter algorithm

Bonus: Additional IOs and Peripherals

We provide a bonus for you. If you can demo your result by the HDMI interface of ZedBoard, you will get bonus points for your project. Besides HDMI, you can adapt all the peripherals on ZedBoard to acquire your bonus score.

Scoring Policy

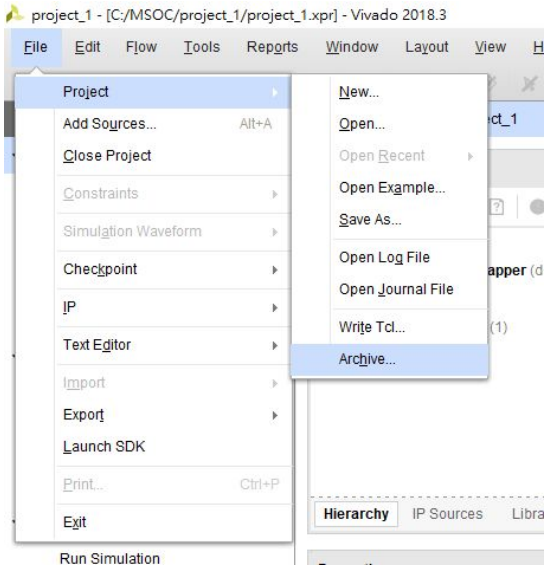
- Performance (40%)

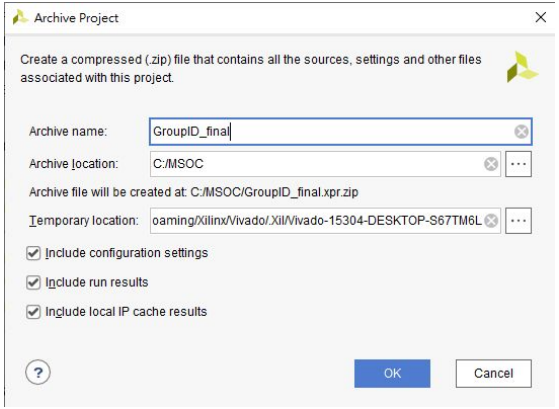
>30FPS	Ranked linearly among groups from 70 to 100pts
<30FPS	baseline FPS to your FPS is linear to 40 to 70pts

- Presentation (50%)
  - Present your design to the class
  - this works as the report of this project
  - graded by your peers and us
- bonus HDMI (10%)

Hand in Files

- Archive your project as followed:
- TA working environment: Vivado 2018.3
- Archive name: **GroupID_final**
- File name: **GroupID_final.xpr.zip**





Submission

Please upload your file to following account via **SFTP**:

IP: 140.112.20.167

port: 10000

User: sftpuser

Password: msoc2019

Deadline

Until **2019/6/21 13:20:59.**

- 1 hour before the last day of presentation

Part 2 SoC literature survey 15%

- Presentation

Recommended topics:TBD

Proposal

- Topics
- Descriptions
- List of reference paper/book
- List of group members
- Due:5/24

Grading policy

- Graded by peers and us on presentation

Presentation Dates

- 6/14
- 6/21
- Propose your presentation topic and prefered date to us by (**TBD**)

Teams

1	R07943014	**5**	R07943128	**9**	R07943001	**13**	b04505025
	R07943008		R07943125		R07943012		F06943014
	B04611028						R07943026
2	R07943175	**6**	R07943013	**10**	R06943084	**14**	R07943097
	B04901015		R07943156		R07943100		R06943178
					R07943162		
3	R07943123	**7**	R07943015	**11**	R07943010	**15**	R06943093
	R07943006		R07943021		D02943005		R05943169
	R07943131						R07943173
4	R07943122	**8**	R07943005	**12**	R07943011		
	R07943022		R07943025		R07943016		
	R07943004						