

INSTITUTO TECNOLÓGICO DE COSTA RICA
ÁREA ACADÉMICA DE INGENIERÍA EN COMPUTADORES
PROYECTO DE DISEÑO EN INGENIERÍA EN COMPUTADORES



Progress report #4 for the project: Design of (ASIPs) for Approximate Computing

Chair for Embedded Systems (CES)
Karlsruhe Institute of Technology (KIT)
Period: 09/04/2018 (week 9) - 20/04/2018 (week 10)

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1 Performed activities

1. **Implement the ASIPs in the error tolerant applications found (ID 03):** The *eucl* assembly instruction was made for the K-Means algorithm. This allows to compute the following operation in a single cycle:

$$rd = (rs0 - rs1)^2 \quad (1)$$

The operation described in (1) allows the execution of the euclidean distance, which is a key calculation in the K-Means algorithm. No other special instructions have been made because it was not possible to have a meeting in the last week with the supervisor Jorge Castro.

2. **Find appropriate error-tolerant applications (ID 02):** The scope of this task is expected to be limited due to the actual project delay. No progress was achieved for this task because getting into an agreement about the scope limitation with the supervisor Jorge Castro is expected.

2 Scope Changes

No scope changes have been officially made, because there was no meeting with the supervisor Jorge Castro on week 10, however, scope changes are expected, which include the limitation of the total number of approximate applications and the scope of the approximations, giving the limitations explained on section 4. This changes could solve the actual delay of the project.

3 Earned Value analysis

The tasks ID with 02 and 03 have been delayed because of the problems reported in section 4 and in previous reports. In general, the project has a delay of approximately two weeks, despite having overestimated the cost of tasks (without the configurations problems), which have been done in less time than planned.

Table 1 summarizes the gained value analysis.

4 Difficulties Encountered

- No official response has been received regarding the errors of the CoSy compiler, so in the meantime, a manually-written assembly program has been made, containing only the special assembly instruction for testing purposes. If the errors of the CoSy compiler

Table 1: Earned Value

Activity ID	Activity	Budget	%Planned Value	PV	AC	%Completed work	EV	CPI	SPI	Initial planned date	Ending date	Initial real date	Real ending
01	Get to know the software platform	32	100%	32	34	100%	32	0.94	1	Week 1	Week 3	Week 1	Week 7
02	Find appropriate error-tolerant Applications	32	100%	32	20	85%	27.2	1.36	0.85	Week 4	Week 6	Week 4	-
03	Implement the ASIPs in the error tolerant applications found	64	66.7%	42.7	15	40%	25.6	1.71	0.60	Week 7	Week 12	Week 9	-
04	Write Project Plan Document	8	100%	8	10	100%	8	0,8	1	Week 1	Week 2	Week 1	Week 3
05	Write Requirements Document	8	100%	8	6	100%	8	1,33	1	Week 2	Week 3	Week 2	Week 4
06	Write Design Document	8	100%	8	7	100%	8	1.14	1	Week 3	Week 4	Week 3	Week 5
	Total			130.7	92		108.8	1.18	0.83				

are not dealt with, the final result will contain only a manually-written version made in assembly, which, due to schedule limitations, will not be the full program (only the calculation process).

- Approximation at a hardware level could not be done for the K-Means algorithm, since the framework ASIPMeister handles a “Flexible Hardware Model” (FHM), which are files with xml and perl code, which were not expected (the understanding of that code is still needed), in their place, HDL code was expected.
- The supervisor Jorge Castro was quite busy for the reported period, which delayed the next possible special instruction’s selection and the analysis of the area and power results obtained from the usage of the first special instruction.

5 Hard Skills Required/Acquired

- Knowledge in the following software frameworks has been acquired: ASIPMeister and Dlxsim.

6 Soft Skills Required/Acquired

The following soft skills have been exercised:

- Self-Motivation: Given that there is no direct round-the-clock supervision, self-motivation has been key in working continuously with the ASIPMeister and Dlxsim on the creation

of special instructions for the approximate applications.

7 Lessons Learned

There are no lessons learned for the reported period.

References