

# Heterogeneous Programming Models: Portability, Performance, and Programmability

## Course Description

## ¿Are system/architecture/parallelism still relevant?



Source: <https://twitter.com/psabdude/status/1304501822451863564>

# Instructor


## Darío Suárez Gracia:

-  Computer Architecture Group, Universidad de Zaragoza, Spain
-  HiPEAC Network of Excellence
-  Previously at Qualcomm Research Silicon Valley working on energy efficient heterogeneous programming models for mobile devices
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## gaZ: Computer Architecture Group

 The University of Zaragoza was founded in 1542

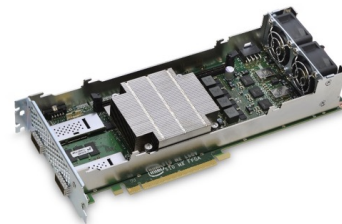
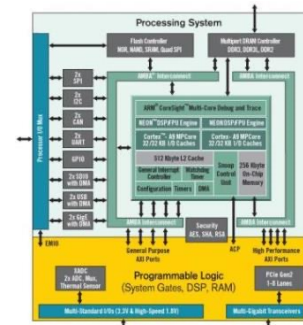
 More than 30000 students and 5000 faculty and staff

 17 faculty members form the gaZ (Computer Architecture group at Univ. Zaragoza)



# Main Research Lines

- ≡ Memory Hierarchy
- ≡ Caches for predictable WCET
- ≡ Scheduling in Real Time Systems
- ≡ Aging
- ≡ Heterogeneous systems:
  - ≡ FPGAs, HW/SW codesign
  - ≡ Heterogeneous execution with CPU, GPU, FPGAs, and accelerators
  - ≡ Load balancing/scheduling/...



## Main collaborators in Heterogeneous Systems



# Learning outcomes

- Get familiar with heterogeneous systems
- Be able to write programs with SYCL/oneAPI
- Understand the basics of High Level Synthesis
- Use FPGAs with SYCL

## Tentative Schedule

Date	Type	hours	Topic
07/25/22	Theory	3	Introduction to Heterogeneous Systems and Programming
07/26/22	Theory	1	Heterogeneous Programming with SYCL 1
<b>07/26/22</b>	<b>Lab</b>	<b>2</b>	<b>First programs with SYCL: add array</b>
07/27/22	Theory	2	Heterogeneous Programming with SYCL 2
<b>07/27/22</b>	<b>Lab</b>	<b>1</b>	<b>Second Lab: pi taylor</b>
07/28/22	Theory	1	SYCL with FPGA: optimizations
<b>07/28/22</b>	<b>Lab</b>	<b>2</b>	<b>Third lab: shift registers</b>
07/29/22	Exam	1	Exam
07/29/22	Theory	0,5	Review
<b>07/29/22</b>	<b>Lab</b>	<b>1,25</b>	<b>Fourth Lab: Pipes</b>
07/29/22			Farewell

# Labs

- ☞ You have to briefly show your solution during the lab session
- ☞ Class repository: [https://github.com/dariosg/eci35\\_hetprog](https://github.com/dariosg/eci35_hetprog)
- ☞ Please send me your github user to share the repo with you

# Evaluation

- ☞ Online multiple-choice quiz on Friday morning
  - ☞ More than 50% correct answers, wrong answers do not subtract
- ☞ After the quiz, collective review of the results
- ☞ Lab completion required

# Questions?



## Your feedback is welcome