Deep Software Variability & intelligent systems

RESIST WorkShop

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Introduction

What if ethical choices depend on hardware?

What is Deep Software Variability ?

The influence of software environment

Hardware

Operating System

Software

X264

Input Data

Performances

The influence of software environment

- Hardware
  - Age
  - # Cores
  - GPU
- Operating System
  - Version
  - Option
  - Distrib.
- Software
  - Compil.
  - Variant
  - Version
- Input Data
  - Size
  - Length
  - Res.

Example

Hardware

Operating System

Software

Input Data

A

Dell Latitude 7400

ubuntu 20.04

B

Raspberry Pi 4 model B

10.4

	x264 --mbtree ...	1	2	x264 --no-mbtree ...	x264 --mbtree ...	1	2	x264 --no-mbtree ...
	animation	vertical	animation	vertical	animation	vertical	animation	vertical
Duration (s)	6	22	6	25	73	351	72	359
Size (MB)	33	28	21	34	33	28	21	34

Example

Hardware

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10.4

1 x264 --mbtree ...

2 x264 --no-mbtree ...

1 x264 --mbtree ...

2 x264 --no-mbtree ...

animation vertical animation vertical animation vertical animation vertical

Duration (s)	6	22	6	25	73	351	72	359	≈*16
Size (MB)	33	28	21	34	33	28	21	34	≈*12

Example

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1 x264 --mbtree ...

2 x264 --no-mbtree ...

1 x264 --mbtree ...

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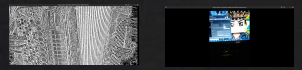

animation vertical animation vertical animation vertical animation vertical

Duration (s)	6	22	6	25	73	351	72	359
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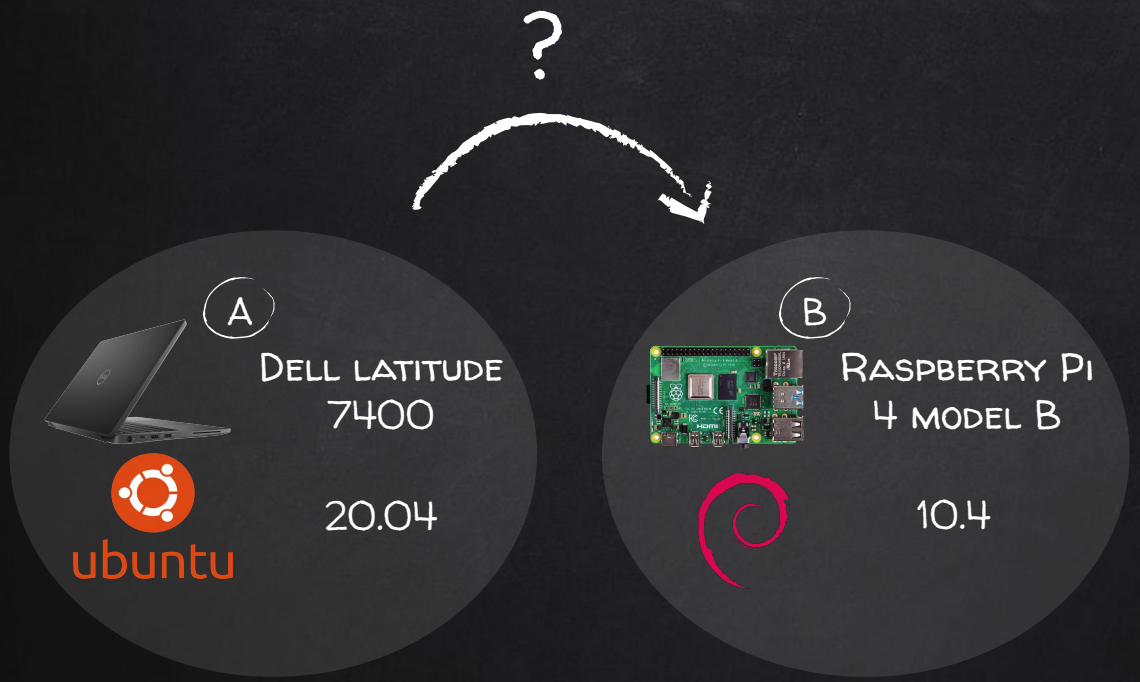
Challenges – Deep Software Variability

Transfer performances across environments



Problem

Options' importances change with environments

Challenge

Transfer performances across environments

Opportunity

Reduce cost of measure

Cross-Layer Tuning

Bug

Perf. ↘

Perf. ↗

Hardware

Operating System

Software

Input Data

Problem

(Negative) interactions of layers

Challenge

Find & fix values to improve performances

Opportunity

Specialize the environment for a use case

Conclusion

- ✘ Deep Software Variability matters
- ✘ Use Cases

Thank you for your attention !