



# A Framework for the Evaluation of Parallel and Distributed Computing Educational Resources

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# Framework Justification

- The World is Parallel
  - PDC is everywhere
  - Single Core processors limited to microcontrollers
- Need a Resource Directory
  - Aid faculty not in the PDC area
  - Highlight Resources for Curriculum Inclusion
    - Easily found
    - Easily Maintained
  - Provide guidance on which resources are appropriate for the user

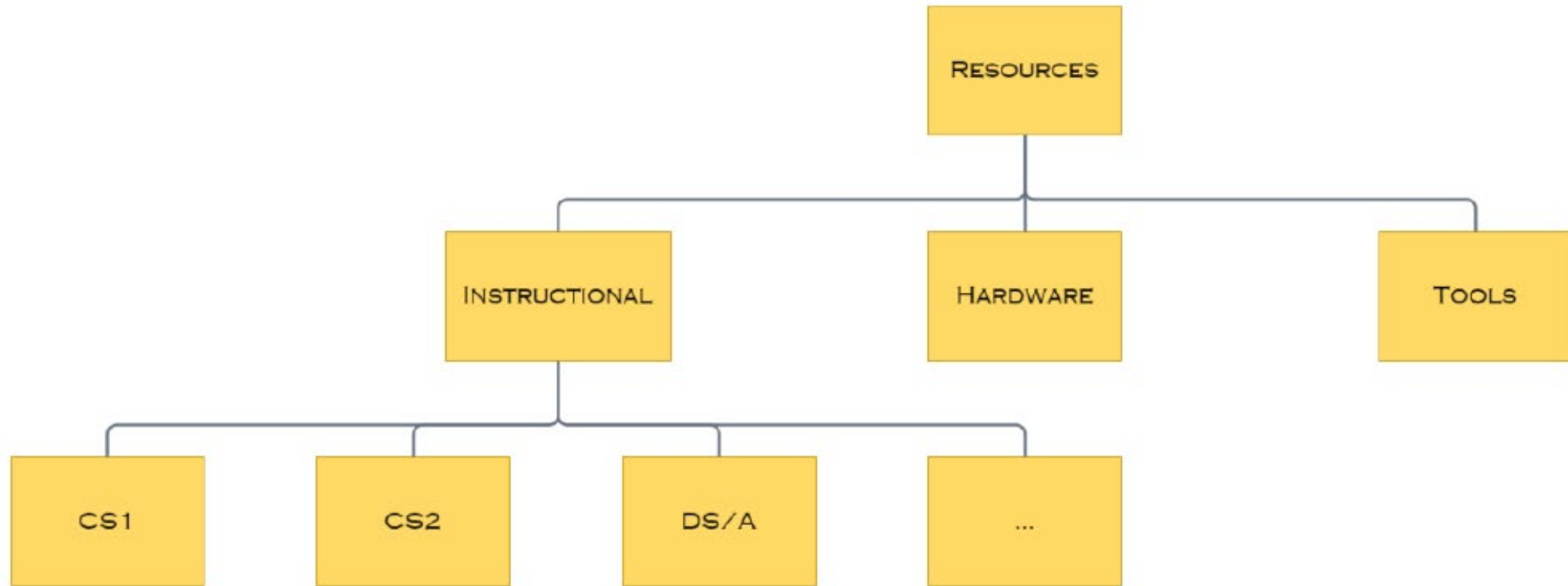
# Implementation issues with Parallel and Distributed Computing (PDC)

- Paper proposes a classification scheme for categorization of PDC educational resources
- The major challenges with integrating PDC into Computer Science curriculum are:
  - Lack of trained faculty in PDC
  - Lack of instructional resources
  - Lack of awareness among CS faculty

# Notes on the Framework

- The focus of our paper
  - Categorization of existing educational resources
  - Provide a quantitative evaluation criteria for each type of resources
- Assumptions and premises
  - There can be other ways of classifying the resources
  - Resources also non-exhaustive
    - Many more resources available that authors may be unaware of
  - Scores assigned for evaluation are subjective
  - Classification and scoring criteria is non-exhaustive
    - Conversation starter
    - Can be expanded upon

# Resource Classification Tree



# Instructional Evaluation Criteria

All supplied documentation is complete or simply in outline form

All material is current or based on older technology

Supplied documents are easily editable or do they exist only in a static form

No special requirements are necessary for adoption or are there significant prerequisites

Solutions to any problem sets are supplied or is it the responsibility of the adopter to develop them

Material is self-explanatory or is specialized knowledge required

Separate resources are supplied for student or instructor as appropriate or are some component resources missing

Setup and configuration instructions are complete and easy to follow or are they vague or possibly misleading

# Instructional Scoring

Resource	IC1	IC2	IC3	IC4	IC5	IC6	IC7	IC8	Score
Bunde and Mache	5	7	5	5	5	6	5	5	43
CDER Curriculum	6	8	6	9	5	9	7	5	55
CMU 15-418 Course	5	6	5	5	5	5	6	5	42
CS in Parallel	10	9	10	7	5	8	9	9	67
Intel + Georgia Tech Partnership	9	9	5	6	5	5	8	5	52
Intel + George Washington Partnership	9	8	5	6	5	6	7	5	51
Intel + Univ. of Oregon Partnership	9	9	9	6	5	5	7	8	58
iPDC	10	9	10	9	8	8	10	8	72
LLNL Intro to Parallel Computing	10	9	7	9	5	9	6	7	62
NCSA	8	8	5	5	5	5	5	5	46
Parallela Boards and Rasp. Pi Integration	7	10	6	5	5	9	7	10	59
Varga	7	10	10	7	5	8	9	5	61

## Hardware Evaluation Criteria

Detailed instructions on how to request access to the hardware are provided

A template for the proposal request is available if needed

The resource has an intuitive and easy-to-use interface

The resource availability is not limited

Student access is allowed



# Hardware Scoring

Rsource	HC1	HC2	HC3	HC4	HC5	Score
Alabama Supercomputing Authority	X	X			X	3
CDER/TCPP & GSU Cluster	X		X	X	X	4
DiaGrid	X		X	X	X	4
Jetstream	X	X	X		X	4

# Tools and Games Evaluation Criteria

Detailed installation and configuration instructions are available

Program is simple to install and configure

Executable is available for Windows Operating Systems

Executable is available for Apple OS/X Operating Systems

Executable is available for Linux Operating Systems

Sample code examples are available

# Tools and Games Scoring

Resource	TC1	TC2	TC3	TC4	TC5	TC6	Score
Deadlock Empire Game - C#-based	X	X	X	X	X	X	6
Intel Distribution for Python	X	X	X	X	X	X	6
Numba for Python	X	X	X	X	X	X	6
Parallel Game from Drexel University	X	X	X	X	X	X	6
Pyjama for Java	X	X	X	X	X	X	6
Tread Safe Graphics Library for C++	X		X	X	X	X	5
WebMapReduce	X		X	X	X	X	5

# Tools Still Needed

- Auto-graders
  - Tools to help debug and score student submissions
  - Without a grader, instructors are challenged to gauge student learning outcomes
- Visualization
  - Some visualization packages DO exist - notably TSGL and the Parallel Game