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Parallel and Distributed Computing submissions

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Contents

I	First part	1
1	Prolusion	3
1.1	Goal	3
1.2	Environment	3
1.3	Project directory layout	4
1.4	Build	5
1.4.1	Xcode	5
1.4.2	Libraries	5
1.4.3	Run	5
1.5	Figures	5
1.5.1	Option inkscape _{latex}	5
	Acronyms	9

Part I

First part

Chapter 1

Prolusion

1.1 Goal

This document offers a comprehensive overview of a project developed in `C`, consisting of multiple modules delivered in incremental phases.

It is not intended as a user guide, but rather aims to describe the project's exploration of parallel computing techniques, leveraging High Performance Computing in certain instances.

1.2 Environment

The project was entirely developed on a macOS system with the help of Xcode IDE. Of course, this will mainly impact the build process.

1.3 Project directory layout

The structure of the project's root directory is outlined below.

```
parallel-distributed-computing/
├── common/
├── hpc/
│   ├── gemm/
│   ├── matmatblock/
│   ├── matmatdist/
│   └── matmatthread/
├── laplace/
├── maxsum/
├── ringsum/
└── parallel-distributed-computing.entitlements
```

`common` package serves as a library of utility functions designed to support and be reused by various modules across the project.

The remaining directories represent the individual project modules, which constitute the deliverables of the project. Under each module the structure is a standard one:

```
<module>/
├── build/
│   ├── deploy-cluster.pbs
│   └── Makefile[.gcc]
├── src/
│   ├── <module>/
│   └── main.c
├── config.sh
└── run.sh
```

Most parts of the `main.c` files are provided by the project supervisor.

1.4 Build

The project was primarily compiled using the Clang compiler.

The build process was carried out either through the `Makefile` (some of which supports compilers other than Clang) or via Xcode. In any case, the project was compiled with the `-O3` optimization flag to maximize performance.

1.4.1 Xcode

1.4.2 Libraries

The following are the dynamically linked libraries integrated into the project.

- `math.h`
- `mpi.h`
- `omp.h`
- `stdio.h`
- `stdbool.h`
- `stdlib.h`
- `sys/time.h`
- `unistd.h`

1.4.3 Run

1.5 Figures

1.5.1 Option `inkscape-latex`

This is an imported SVG with `LATEX` embedded text.

This is an imported SVG without `LATEX` embedded text.

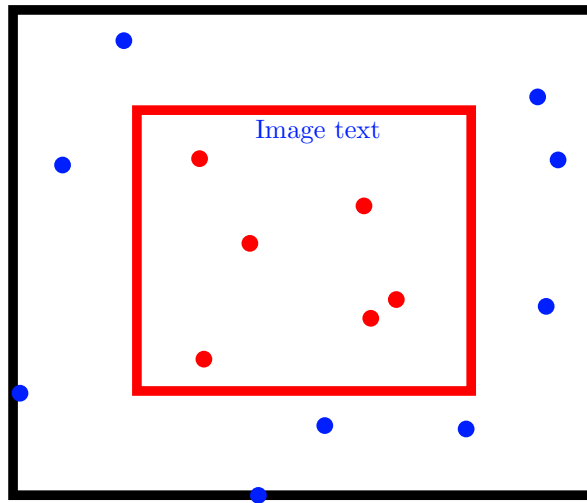


Figure 1.1: *True inkscape latex option*

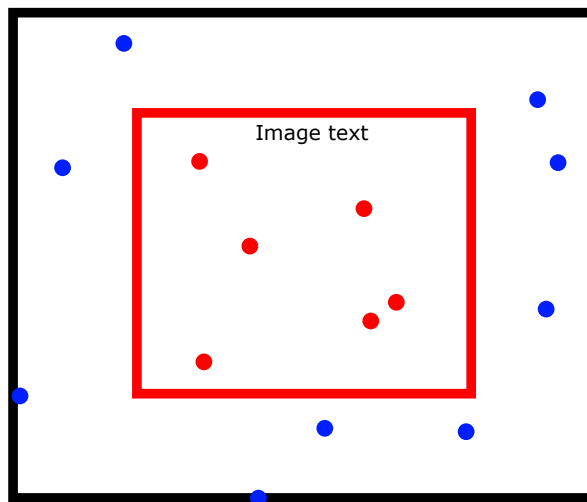


Figure 1.2: *False inkscape latex option*

Acronyms

HPC High Performance Computing 3

IDE Integrated Development Environment 3