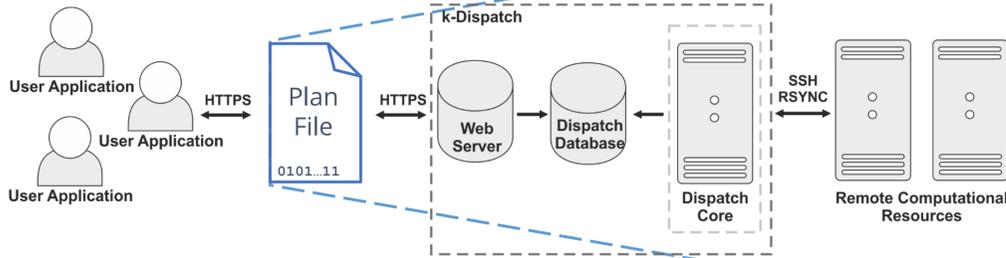


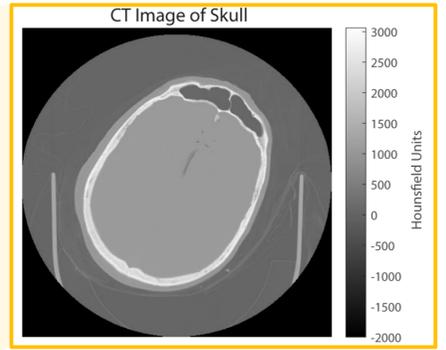


1 Introduction

k-Dispatch mediates between user applications and remote computational resources. It provides automated task scheduling, execution and monitoring. Task graph generation, scheduling and execution is based on the provided plan file holding simulation details and input data.



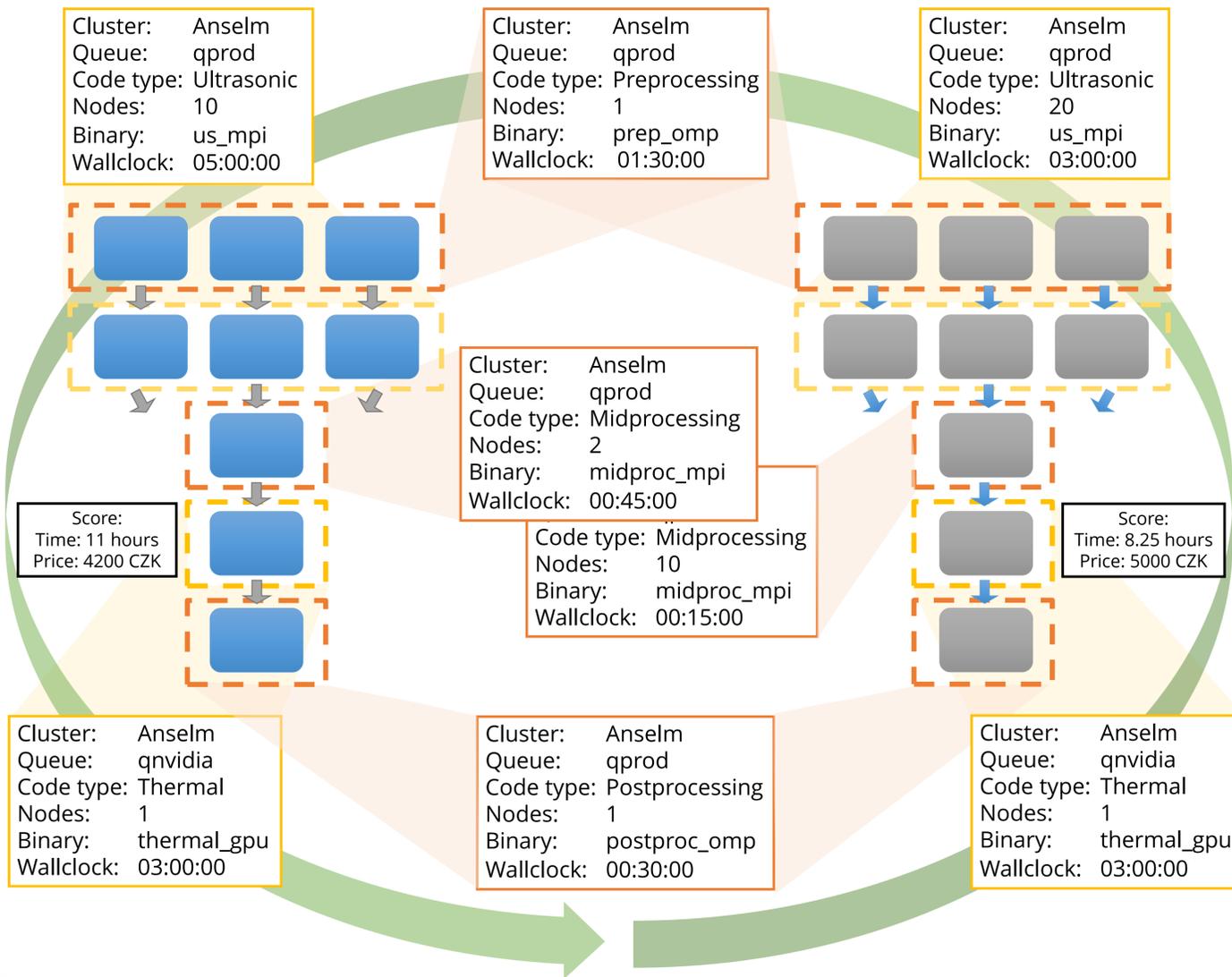
Simulation type: NEUROSTIM
Sonications: 20
Time step: 20 ns
Time steps: 1000
Medium:
Linear: True
Absorption: Bio
Homogeneous: True
Elastic: False
Nx: 512
Ny: 768
Nz: 512



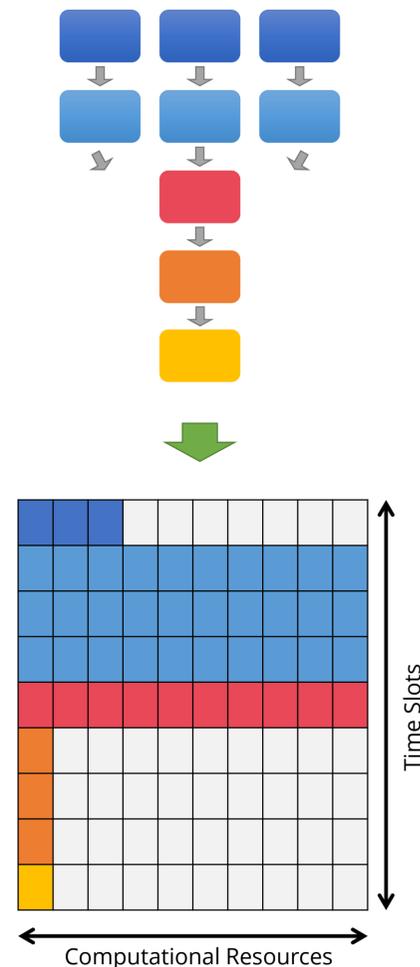
(0,119,0): 0.75, 0.75, 0.75, 0.8, 0.8,
(0,119,20): 0.75, 0.75, 0.75, 0.8, 0.8,
(0,119,40): 0.75, 0.75, 0.8, 0.8, 0.75,
(0,119,60): 0.75, 0.75, 0.75, 0.8, 0.75,
(0,119,80): 0.75, 0.75, 0.75, 0.75, 0.75,
(0,119,100): 0.75, 0.75, 0.75, 0.75, 0.75,
(0,120,0): 0.75, 0.75, 0.75, 0.75, 0.75,

2 Task Graph Mapping on Computational Resources

The task graph exploits concurrency and dependencies in complex workflows. The execution configuration for each task is optimized in one pass over all available allocations. The optimization process is based on collected historical performance data, updated after each successful run. Due to incomplete datasets, interpolation and machine learning methods are sought for the optimization process. Candidate task graphs are then evaluated with the goal to find the one that meets given time or cost constraints, and minimizes time spent by idling in queues.

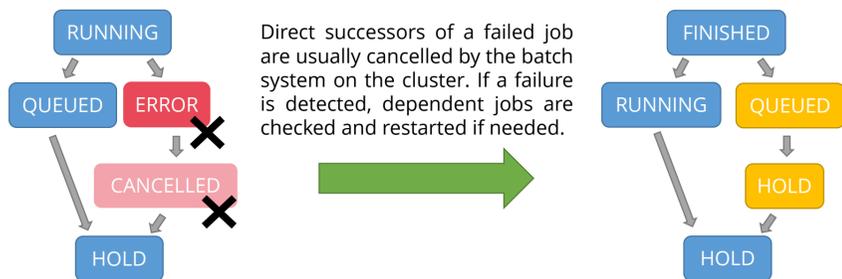


Best task graph is submitted into queues. The batch system is responsible for appropriate mapping on resources.



3 Monitoring and Fault Tolerance

Submitted jobs are periodically monitored and their statuses updated. In the case of failure, error and cancelled jobs are detected and restarted. Suspicious jobs may be detected using timestamps and log files.



4 Open Questions

There are several challenges to be addressed. Those cover (1) one-pass and multi-pass techniques for the optimization of execution configuration, (2) managing of huge data files, their copying or repeated generation, (3) monitoring of cluster utilization to improve scheduling. The key question is quality evaluation of optimized execution configurations since cluster environment is highly dynamic. The solution may be evaluation on dedicated resources or in simulation.

5 Conclusions

k-Dispatch is a framework for managing medical and ultrasonic applications. At this time, one-pass optimization of execution configurations is being developed. Simple task graphs are to be created and used for collecting performance data.

