Workpackage 9: Prototyping

Objectives

Prototypes can be can be constructed quickly in parallel functional languages because they describe parallel coordination at a high level of abstraction and directly support many of the underlying concepts, including higher-order functions and polymorphism. The high level of abstraction has an implementation cost, and implies that the functional skeletons will not be as efficient as the instantiation constructed in WP4. Instead fast construction will enable alternative parallel versions of the proposed skeletons to be prototyped, and the quick delivery of a prototype skeleton library.

- To prototype alternative coordination behaviours as part of the skeleton standardisation process.
- To quickly deliver a prototype instantiation of the standard skeleton library, and subsequent versions.

Description of Work

A skeleton has both computational and coordination components, and often alternative coordination behaviours are possible, e.g. a parallel map may be data parallel, or a task farm. There are also lower-level alternatives, e.g. should workers on the task farm pre-fetch tasks, and if so should the number be controlled by a parameter?

The first objective of this workpackage is to aid the standardisation process by exploring alternative coordination behaviours for the skeletons. The prototypes will be constructed relatively quickly in Eden, a parallel extension of the standard Haskell non-strict functional language. Alternative Eden skeleton implementations can be measured and compared on our Beowulf and Sun SMP platforms (Deliverable 1).

Because the skeletons can be quickly developed in Eden, a prototype version of the standard skeleton library can be delivered early to users. This library can be used from any host language given an appropriate interface, and we will provide a C interface and wrap the library as a COM object (Deliverable 2).

Deliverables

1. A report evaluating alternative coordination behaviours for the standard skeletons.
2. An accessible Eden prototype of the standard skeleton library.

Milestones and Expected Results

The prototyping will start once the first draft specification of the skeletons library exists (6 months from beginning), and will be completed 10 months later. The report on alternative coordination behaviours will be provided at this time. Constructing the C interface and COM wrapper for the prototype standard library will require an additional 2 months. Once the prototype library is complete, applications using it can be tested.