High Throughput Computing in Australia: Applications, Tools and Services

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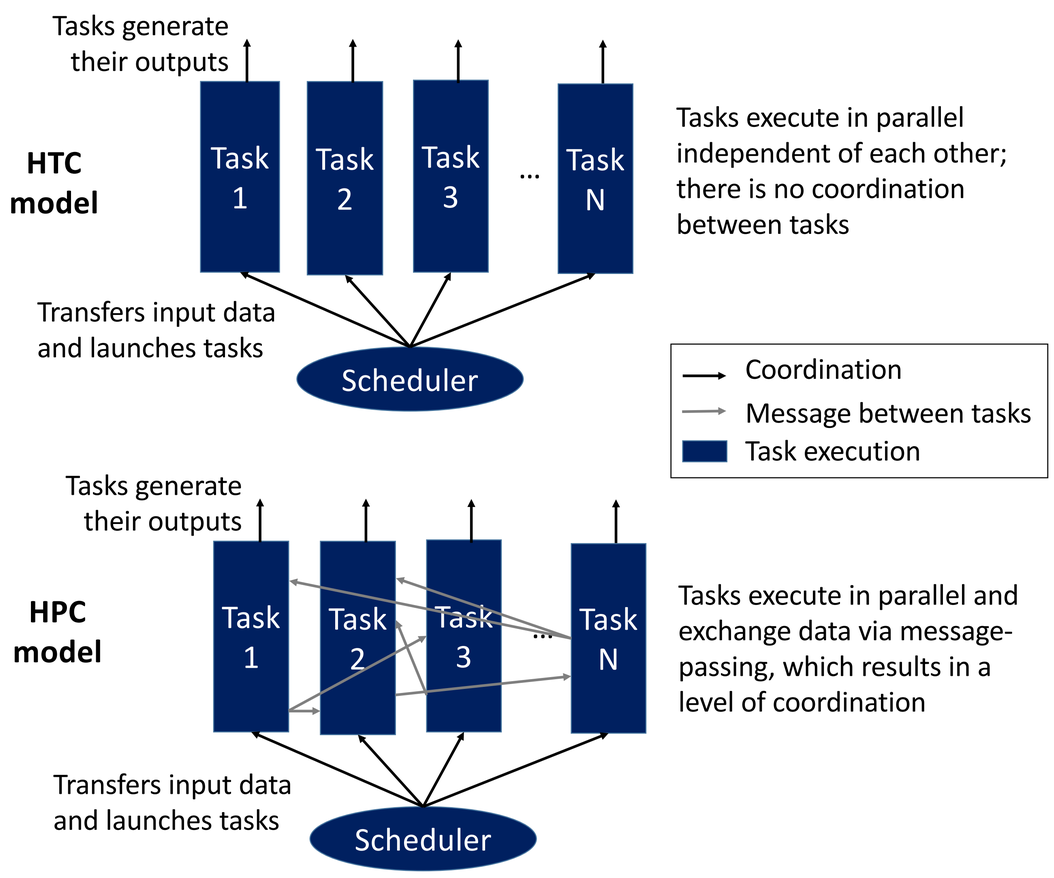
Project Goals

In this project, we investigated the current and future demands for high throughput computing (HTC) tools and services in the research sector in Australia and how these services can be effectively supported. To be more precise the following questions were answered:

- What are the requirements of NCRIS capabilities and major research groups for these types of services?
- What exemplars are there in Australia and internationally of these kinds of services?
  - Commercial cloud services, hybrid cloud, specialized hardware?
- What is the best approach for supporting these services on different infrastructures (including the Nectar Research Cloud) and how can we encompass hybrid cloud including local infrastructure (clusters, local cloud, etc.), and commercial cloud?
- How can we best take advantage of commercial cloud pricing options for these requirements?

HTC vs. HPC

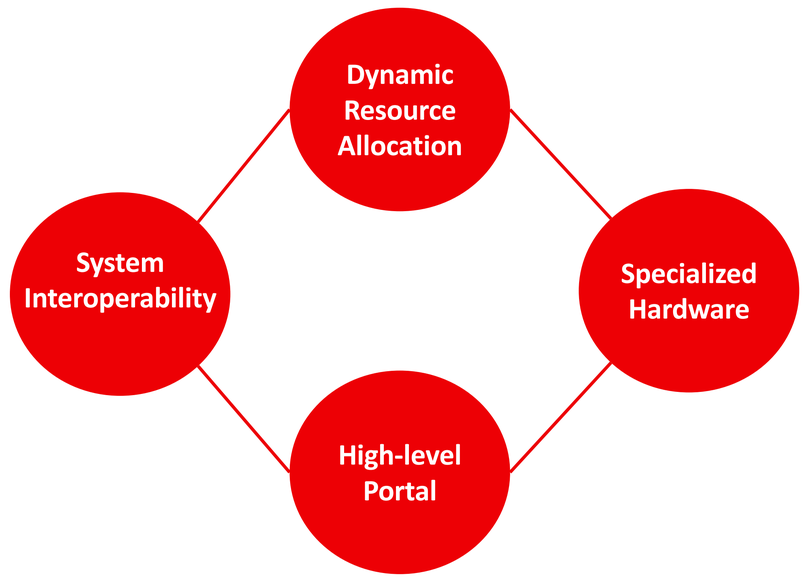


Commercial Cloud Pricing for HTC Applications

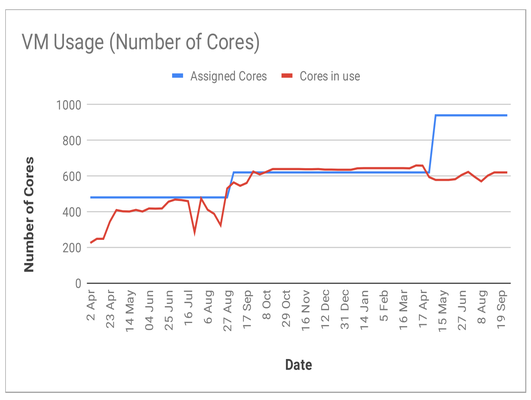
- **Reserved Resources:** Discounted pricing (up to 80%) for specific usage (number and type of VMs) and duration (up to 3 years). Examples: AWS Reserved Instances, Google Committed Use Discounts, Azure Reserved Instances and IBM Reserved Virtual Servers.
- **Discounted Resources:** Way providers monetize their excess capacity. Dynamic pricing based on supply and demand, but significantly cheaper than normal prices. These resources can be used to run HTC applications with very low prices. Examples: AWS Spot Instances, Azure Low-Priority VM, Google Preemptible Instances and IBM Transient Servers.
- **Research Credits:** Most commercial cloud providers have research support program where they offer free resources to researchers around the world on a merit-based process. This can be leveraged for development of new applications or some of the new scientific projects. Examples: AWS Cloud Credits for Research and Google Research Credit.

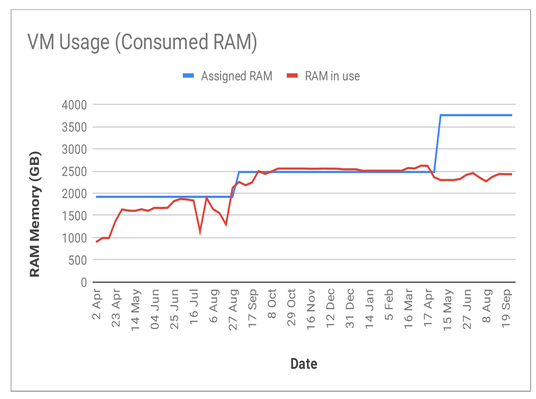
We thank Intersect for supporting this project.

HTC Application Requirements and Demands



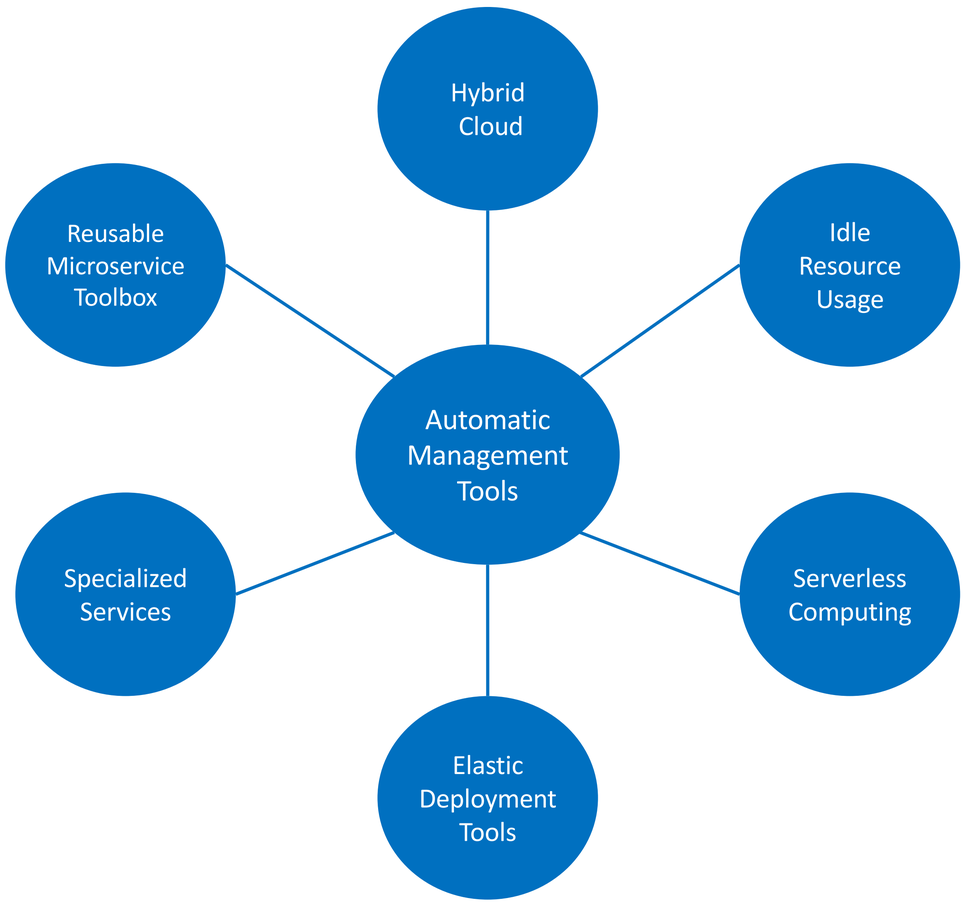
Exemplar Resource Utilization





The graphs show resource usage analysis from the utilization of Intersect SpaceTime Research Cloud Computing Service (including the Nectar Research Cloud) from one of the Intersect academic partners. Automatic management tools and harvesting idle resources for HTC applications are possible solutions to improve resource utilization.

Proposed Solutions and Recommendations



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