

# Resource Co-Allocation in Multi-site Computing Environments

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A number of distributed applications require simultaneous access to resources located in multiple administrative domains. In order to co-allocate resources in these environments, users need to reserve them in advance to meet their expected Quality of Service and enhance utility of their applications. Resource providers must frequently update their scheduling queues to reduce turnaround time of user requests and increase resource utilisation. However, as all sub-requests of a co-allocation request must start at the same time, any modification in a single site may affect the requests of other sites.

Due to the management complexity of resource co-allocation requests, their current usage is based on static advance reservations, which results in a low system utilisation. The aim of this project is to design and investigate management and scheduling policies for co-allocation requests with adaptive and flexible Quality of Service parameters.

**An Application Driver:** There are a number of applications, in both academic and commercial environments, that require resource co-allocation. Some examples are (i) applications that require computing power that is not available in a single site; (ii) applications that require different resource types that are not available in a single site; (iii) users who need to speed up the execution of their applications; and (iv) redundancy of resources to improve fault tolerance during an execution. In this project we use large scale parallel applications as a driver for the development of our resource management policies. As these applications require multiple supercomputers we have to deal with problems such as splitting the application according to resource availability, performing the rescheduling when there are updates in the scheduling queues and keeping synchronised the co-allocation requests in the different resource providers.

**Key Reference:** Marco A. S. Netto, Kris Bubendorfer and Rajkumar Buyya. *SLA-based advance reservations with flexible and adaptive time QoS parameters*. Proceedings of the International Conference on Service Oriented Computing (ICSOC), Vienna, Austria - September 17-20, 2007.

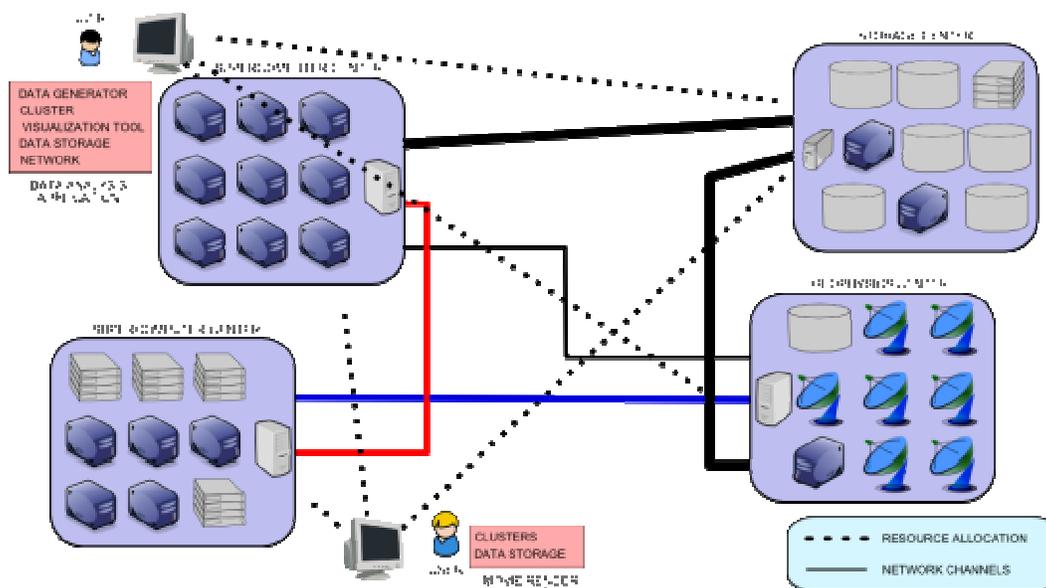


Fig. 1: Co-allocation of different types of resources from different organisations.