StarPlane
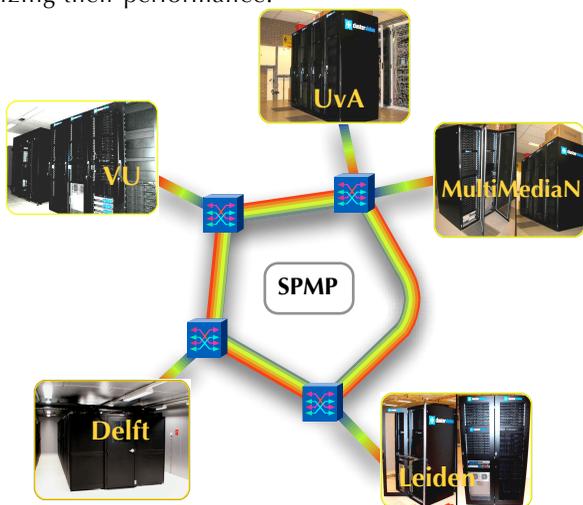# An Application Controlled Photonic Network

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Introduction

StarPlane is a NWO funded research project carried out by the researchers of the University of Amsterdam (UvA) and the Vrije Universiteit (VU). The project aims at building a pioneering "application controlled photonic network" in the Netherlands. It enables applications running on the Distributed ASCI Supercomputer (DAS-3) to request lightpaths on a dedicated portion of the Dutch research and education network SURFnet6. By provisioning multiple lightpaths in a short timescale, StarPlane empowers applications to change the underlying network topologies to satisfy their computational requirements in real time, thus optimizing their performance.

StarPlane Middleware Architecture

StarPlane management plane (SPMP) provides a Web Services interface to the Grid application and job scheduler on DAS-3 and interacts with the network control plane that manages the configuration of the photonic network devices provided by SURFnet.
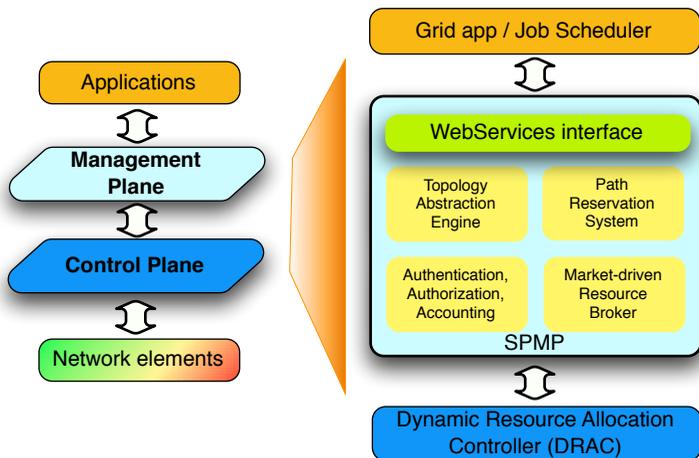
Network Monitoring

The StarPlane network monitoring system will provide not only real-time information of the configured paths between DAS-3 sites (*lightpath-centric*), but also an overview of the end-to-end performance of each application (*application-centric*) using StarPlane network. Moreover, it will be able to show the dynamic network topology changes by fetching the topology information from the management plane.

Ping Avg [ms] (row >> column)				
	VU	LIACS	UvA-1	UvA-2
VU	----	1.399	2.612	----
LIACS	1.395	----	1.243	----
UvA-1	2.611	1.243	----	0.02895
UvA-2	----	----	0.02953	----

Throughput [Mbit/s] (row >> column)				
	VU	LIACS	UvA-1	UvA-2
VU	----	5138	4501	----
LIACS	5117	----	4968	----
UvA-1	4410	5000	----	5480
UvA-2	----	----	5561	----

The tables above present the measurement results of round-trip time and throughput between DAS-3 clusters by using the rTPL (remote Throughput Ping Load) software.

e-Science Applications on StarPlane

In StarPlane we also investigate how applications can benefit from the flexibility and performance of this photonic network. Several classes of applications are being considered, ranging from file transfers, to eVLBI and medical modeling.

One particularly communication intensive application is Awari, an example of distributed game-tree search. Up to now, solving the age-old game of Awari was only feasible on a single large compute cluster. During a 91 minute run, Awari sends 1.6 billion messages, transferring 7.3 Terabyte of data. Using StarPlane, Awari can successfully run distributed over three DAS-3 clusters, while achieving a performance (shown in the figure below) that is close to that of a single larger cluster.