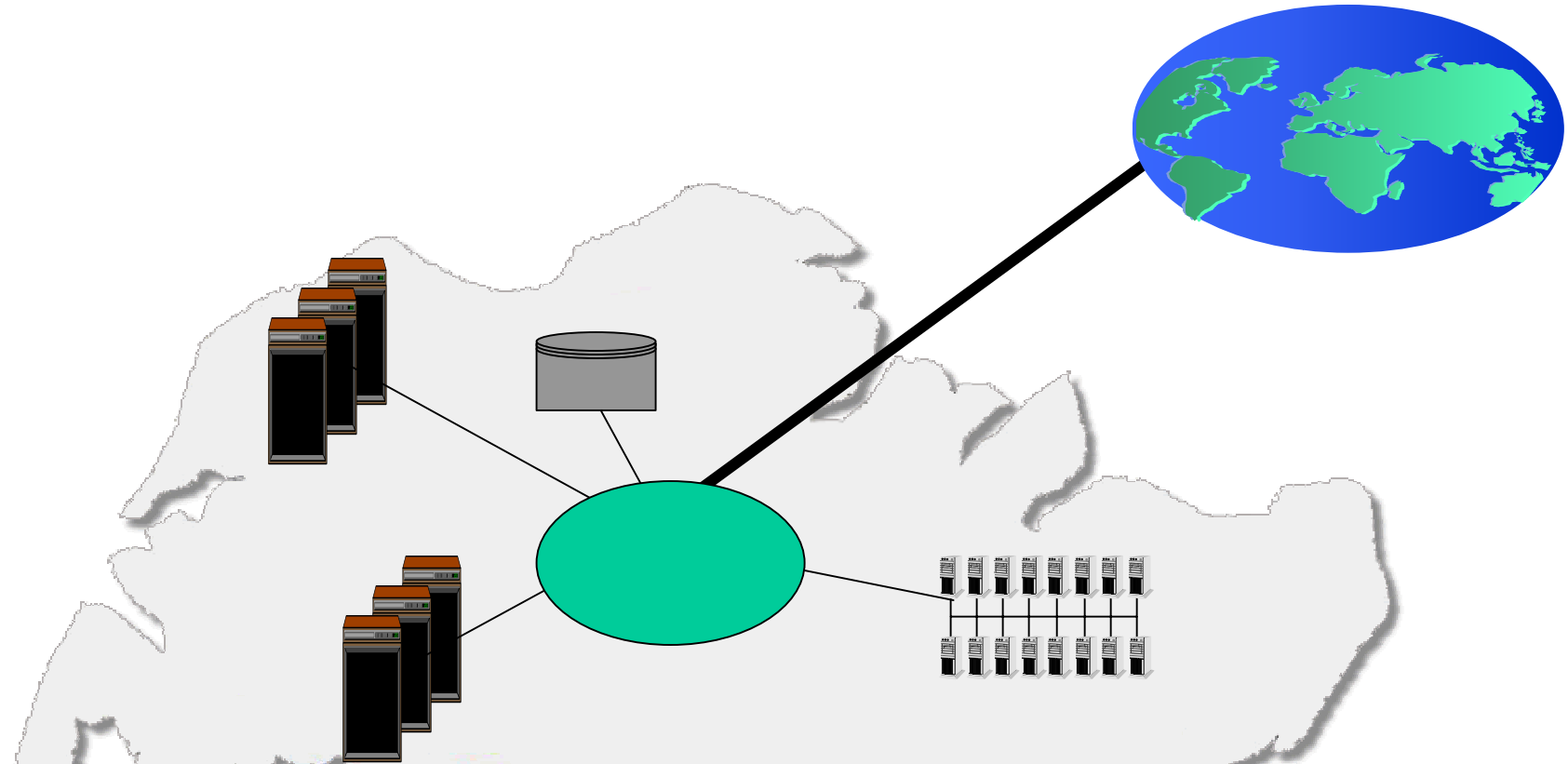
Sub-theme: Grid fabric

What's Grid fabric ?

- Nut's and bolts that keeps the Grid going.
- It encompasses
  - High performance network protocol
  - Optical Networking
  - Computation resources
  - Storage devices
  - Instruments



Storage : 20+ TByte

CPU: 450+

Organisations: DSI, NUS, NTU, I2R, BII, SMA, IHPC, NGO, SingAREN

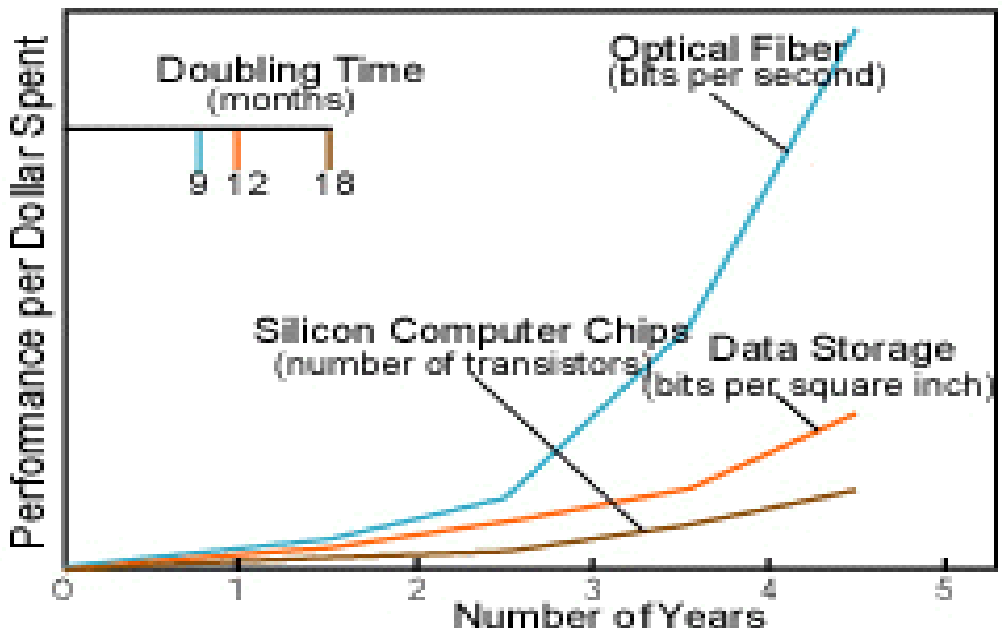
International R&D networks

- Need to connect the R&E community to the international community
- International Networks, eg. Starlight, Geant, CANet4, APAN, UKERNA 4
- SingAREN, R&D network single point of presence for the community.
- National Grid Pilot Project(NGPP) national interconnect.

Optical Networking

Optical Network has emerged to be the 21st century Driver for the Grid

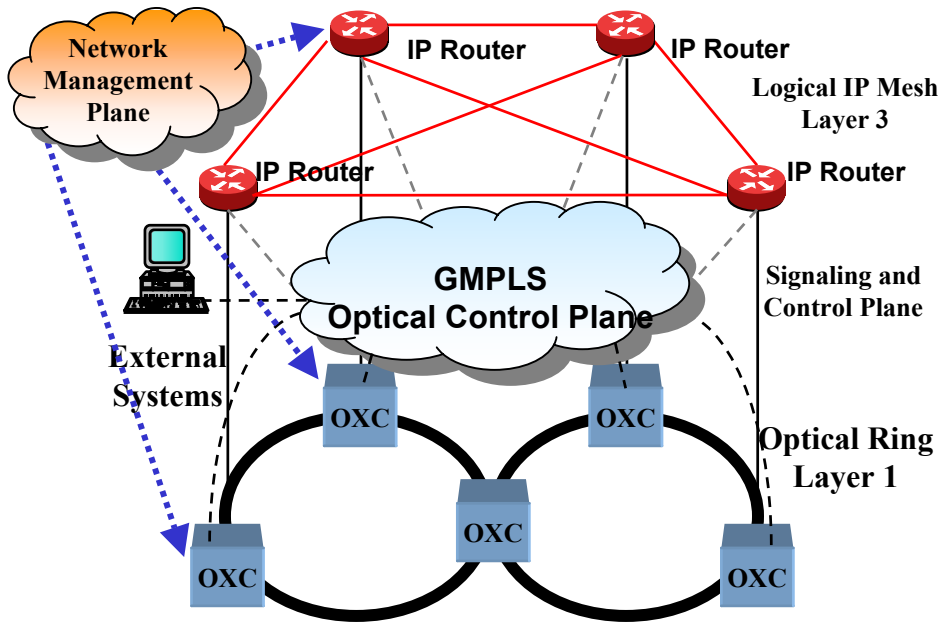
- Grid applications are data-intensive and network-intensive;
- High speed, high performance network infrastructure is required to link up advanced resources to support Grid computing;
- Parallel Lambdas provide the raw capacity to drive and change the relationship of computer and network;



From Gary Stix, Scientific American, January 2001

Optical Internet: IP over WDM

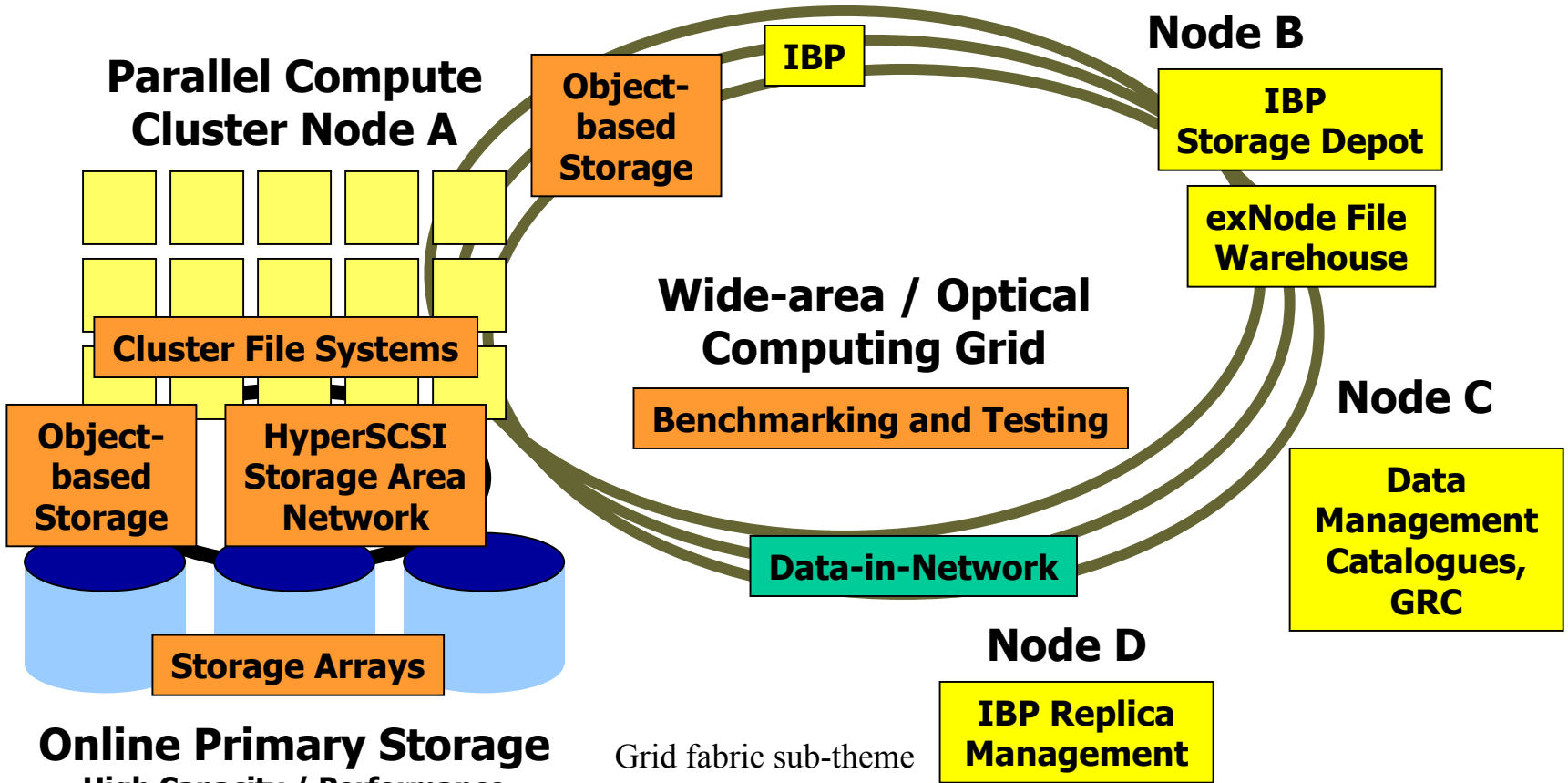
- Optical Internet is the future fabric for GRID computing
- Three research focuses in the area:
  - *Optical Virtual Private Network
  - *Optical Multicast
  - *Optical Burst Scheduling



Storage as a Key Fabric Component

Computing applications require input and produce output data which needs to be stored efficiently and reliably

Intra-Cluster Storage **Distributed Storage**



Quality of service in Grid

- QoS is desirable in Grid services
- Main QoS components in GRID
  - GRID Middleware & storage QoS
  - Networks QoS
  - Host OS and host's communication stacks
- They have to be integrated and work in harmony.
- Is network QoS still an issue?
  - Yes, when over-provisioning is not an option (e.g. in access networks), and is likely so if Grid services become utilities.

Challenges in Network QoS

- Why (IP) network QoS is still not widely available?
  - Non-QoS-specific: Egs, who pay for QoS? How do ISP work together
  - QoS specific issues: eg., Inter-domain QoS remains a big problem(complexity and reliability)
- "Grid services" is a motivating factor for more R&D in network QoS
  - Enhancement of existing QoS architecture
  - New QoS enabled network architecture
  - high performance network protocols

Organisations and expertise

	Optical	Distributed storage	Network protocol	R&E Network
SCE-NTU		X	X	X
NUS	X		X	X
DSI		X	X	X
EEE-NTU	X		X	X
I2R	X	X	X	X

	Key researchers
Optical Networking	GS Poo, CK Siew, Zhou Luying, TH Chen, Li Jianqing. Shum Ping, Zhang Lin, Feng Gang, M Ma.
High performance networking	HK Pung, CK Tham, Rajeev Shoray, Ananda A, Fu Chenpeng, CK Siew, CH Foh, Winston Seah
Data storage	BT Khoo, Wang Yonghong, Wang Donghong, Han Binhua, Tang Ming, CK Yeo, BS Lee, LH Ngoh, YL Zhu, Premalatha Naidu, HN Yeo
R&D network connectivity	LH Ngoh, BS Lee, Jon Lau, HY Lee, Lawrence Wong, (NGPP, SingAREN)

Let’s START

Grid fabric sub-theme
22 Sept’2003