


Dr. Kenneth P. Birman

Founder and Chief Scientist

November 21th 1995



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Corporate Profile

Isis Distributed Systems

- ✦ US Govt Funded Research Project
- ✦ First product shipped in 1991
- ✦ Acquired by Stratus Computer in December, 1993
- ✦ Currently 100+ employees, 150+ customers
- ✦ Industries include Financial Services, Telecommunications, Manufacturing and Government/Scientific
- ✦ Products run on most major UNIX systems as well as Windows NT, Windows 3.1, VMS, VOS & FTX



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Reliable Distributed Computing


- ✦ Required in critical applications: finance, telecommunications, air traffic control, power systems management.
- ✦ Traditionally addressed late in the game: first build the system, then harden it.
- ✦ Must be compatible with standard tools for building distributed applications.



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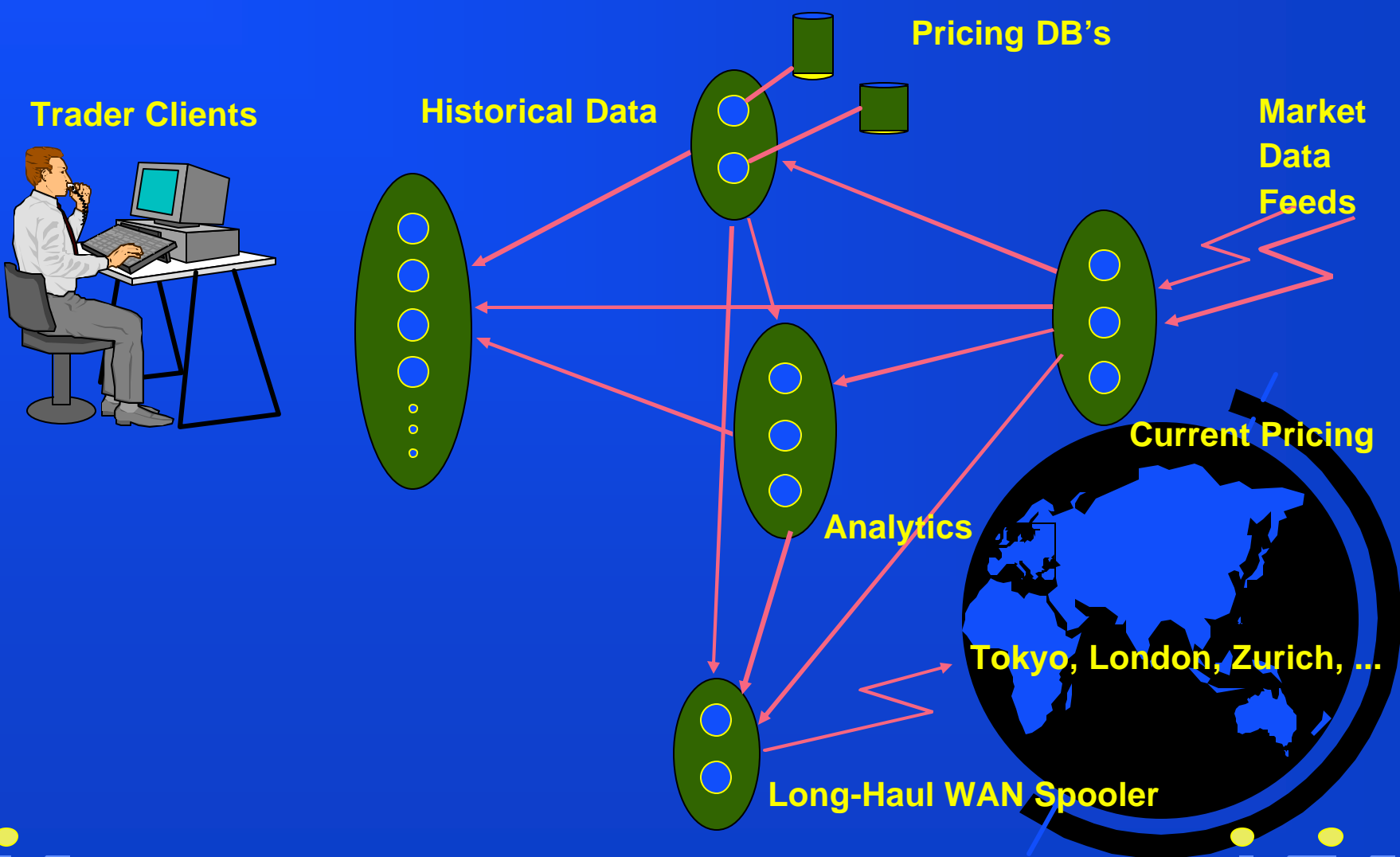
What makes it hard?

- ✦ Need to replicate critical data and servers, but lack tools for doing this easily.
- ✦ Need a way to detect failures, but failure reporting is often erratic, inconsistent.
- ✦ Need a way to restart failed system components so they can rejoin the system, but without disrupting service.



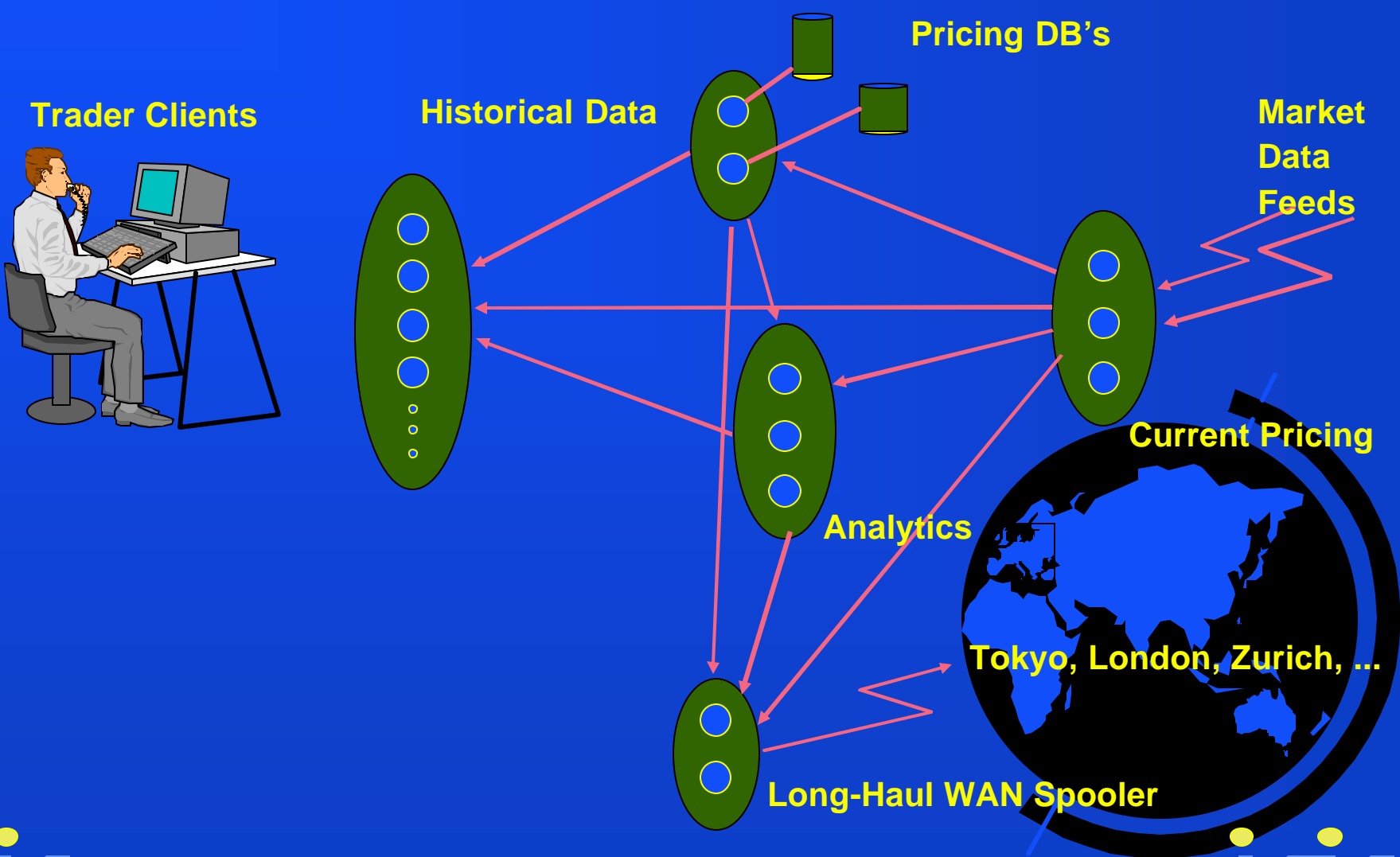
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Distributed Trading System

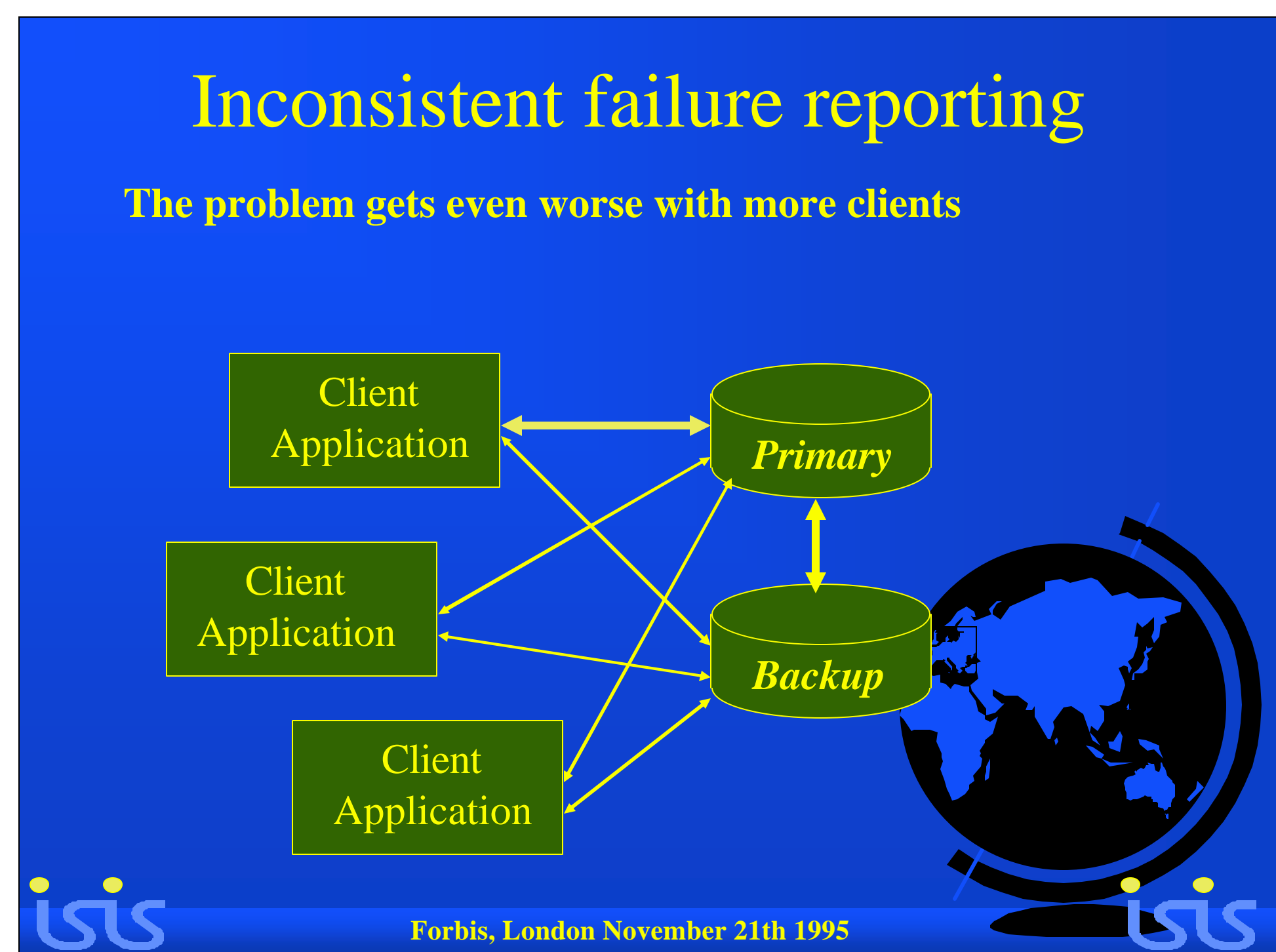
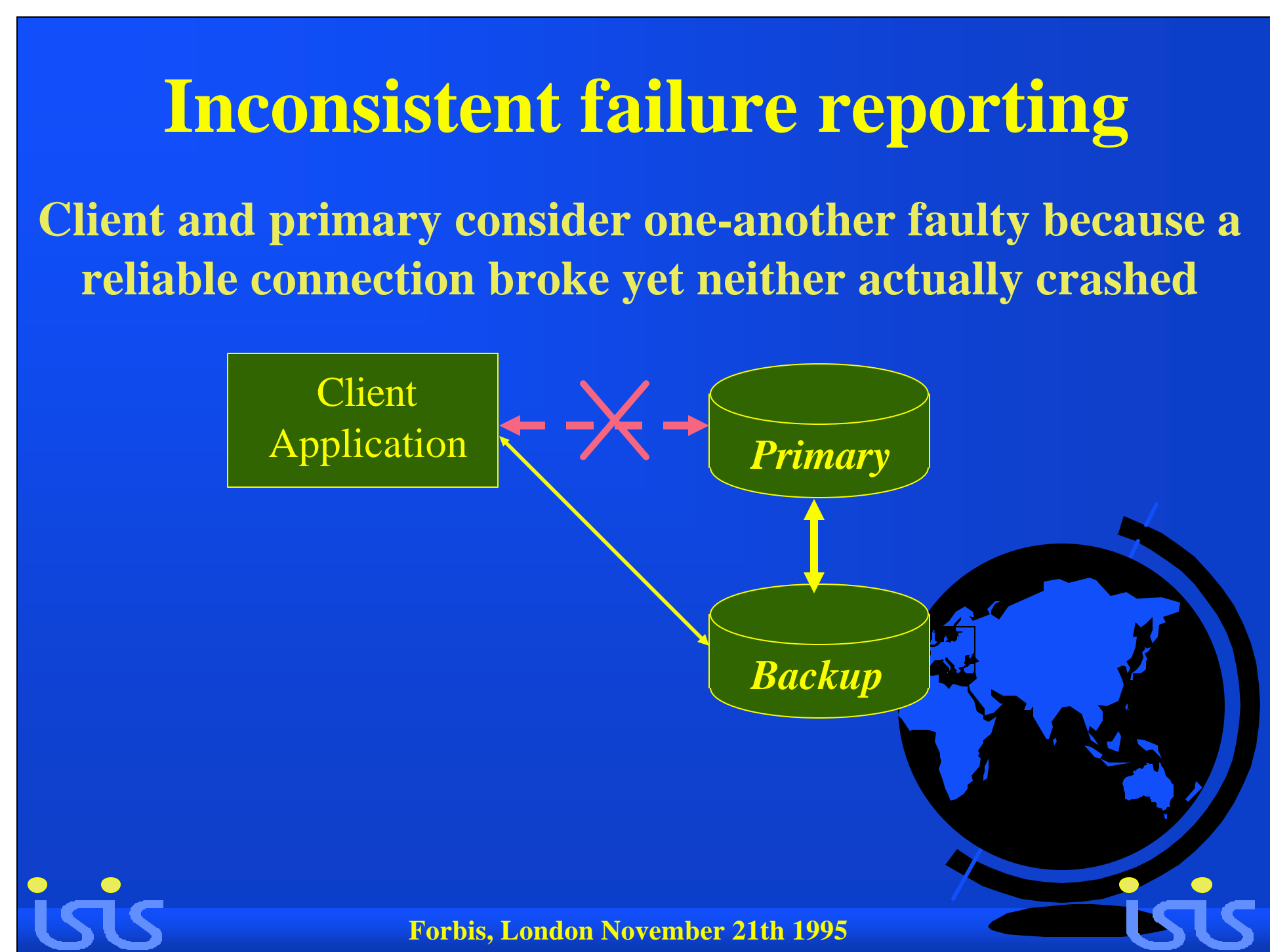
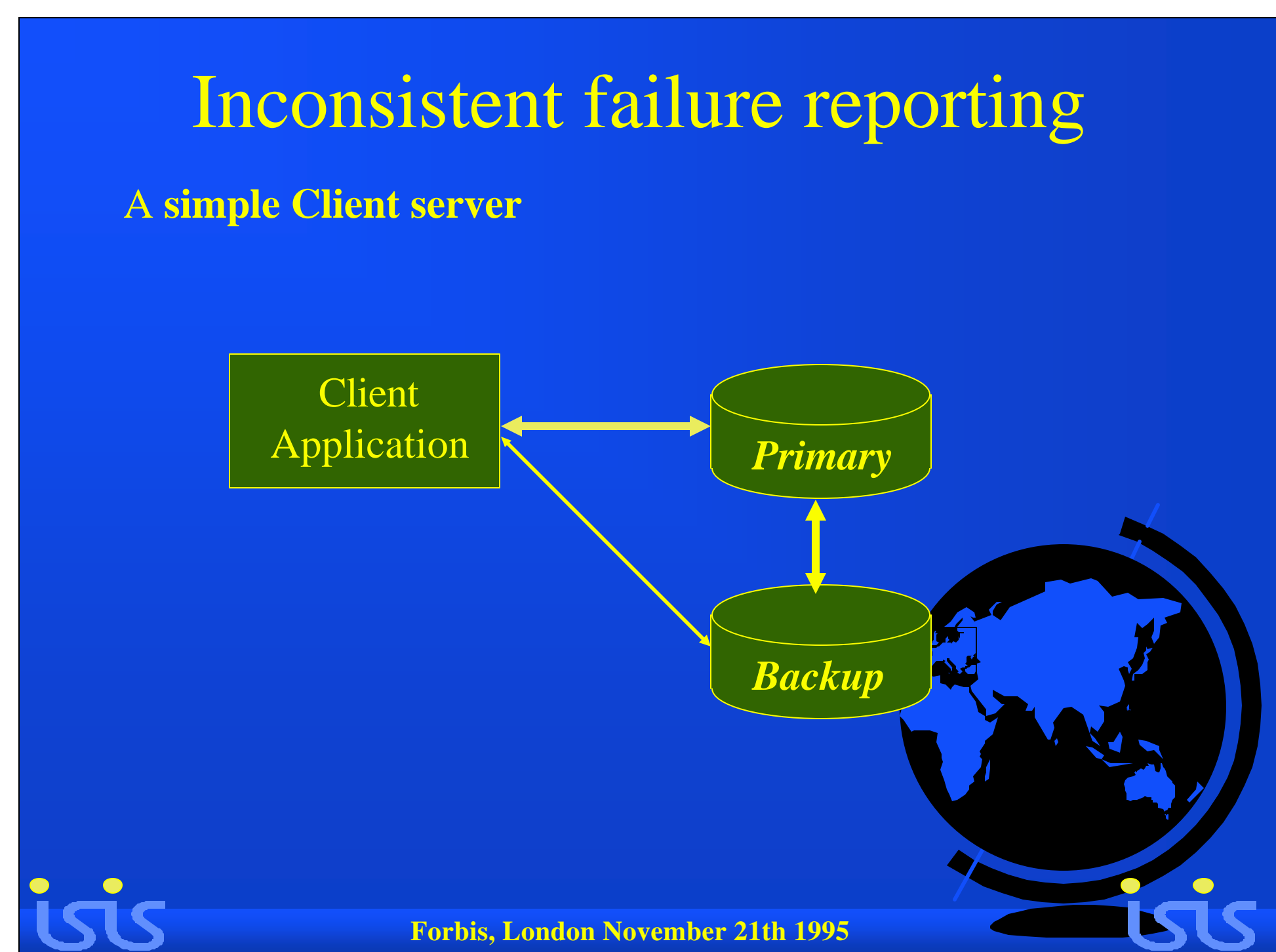
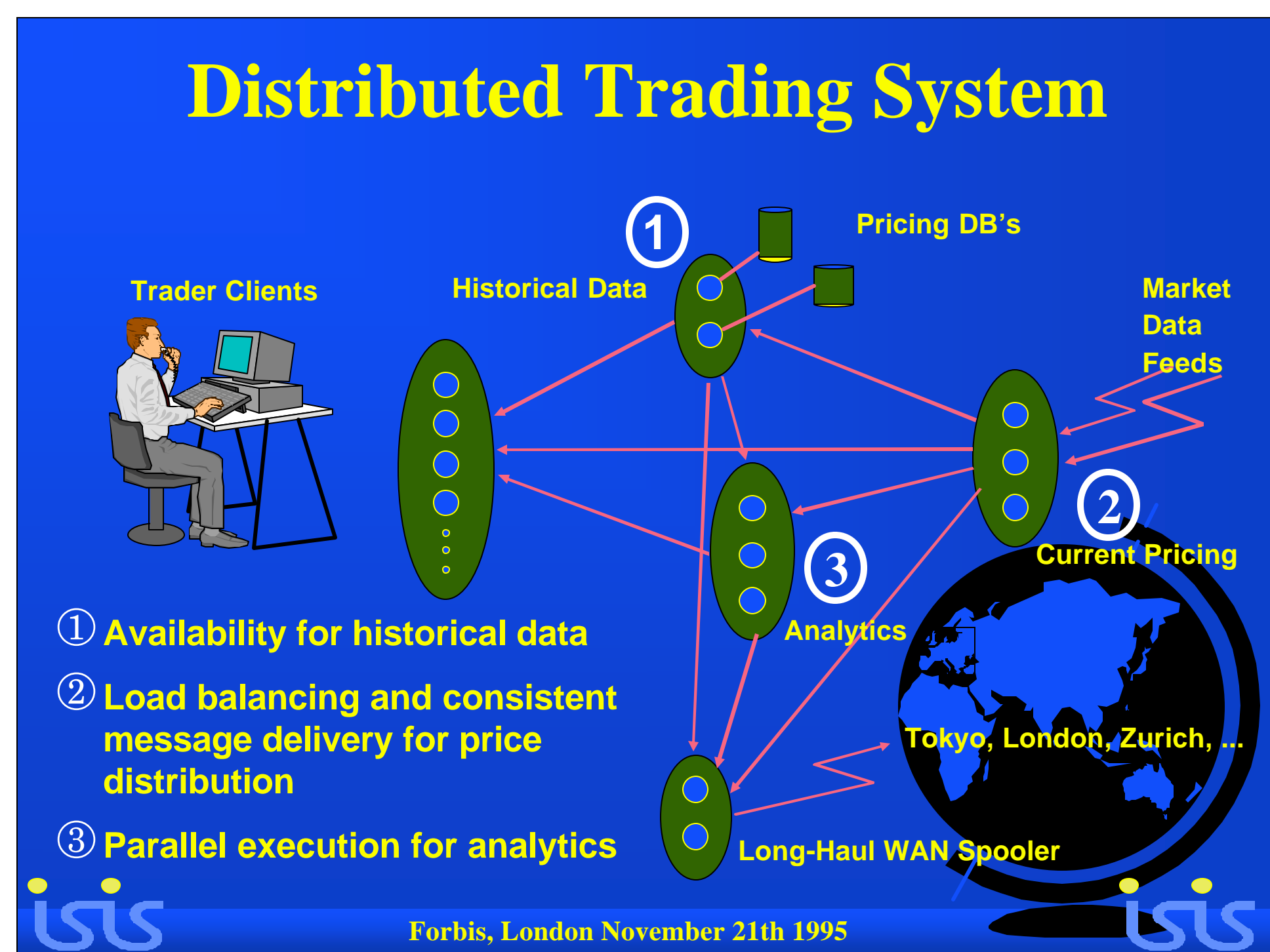
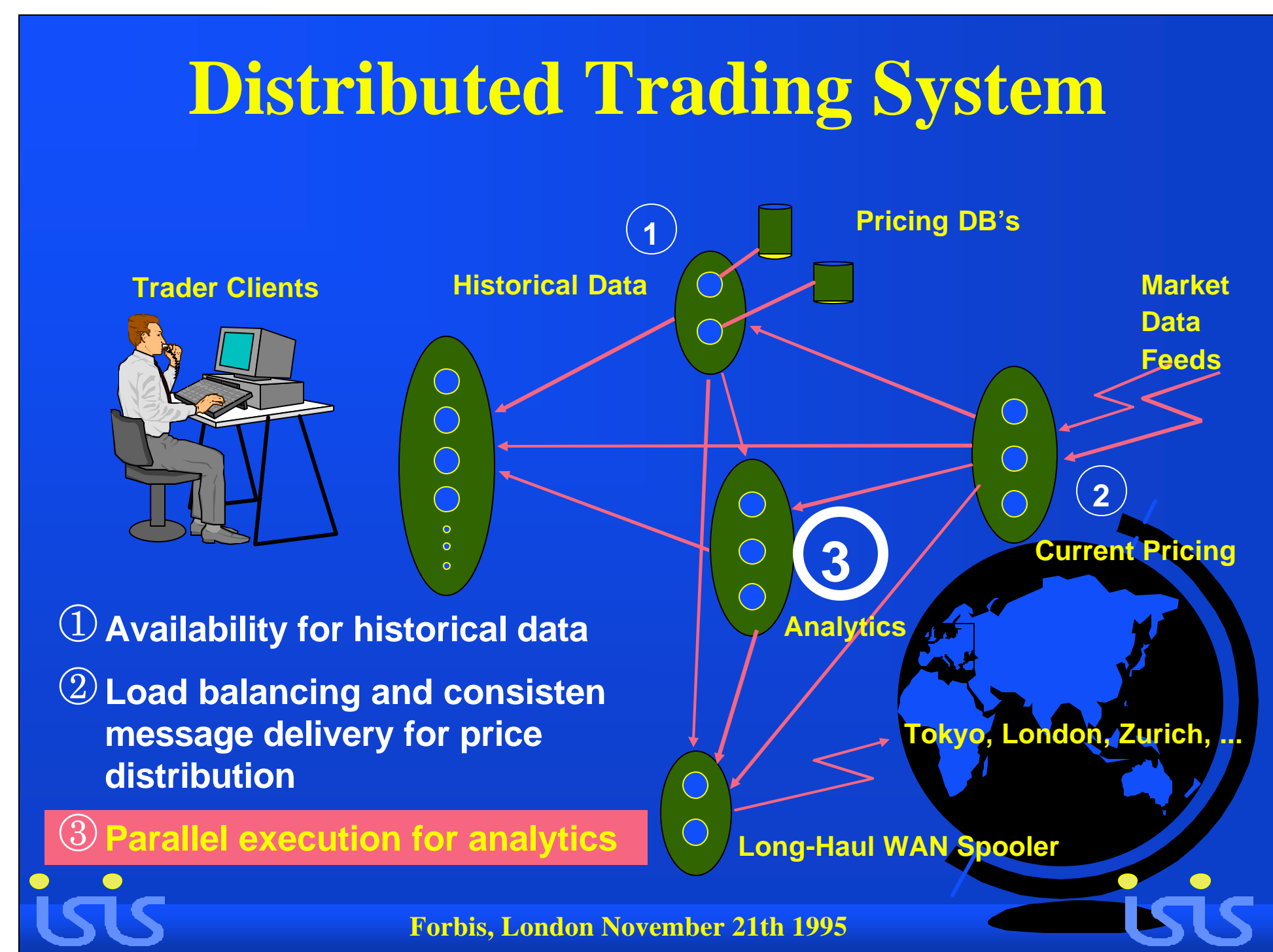
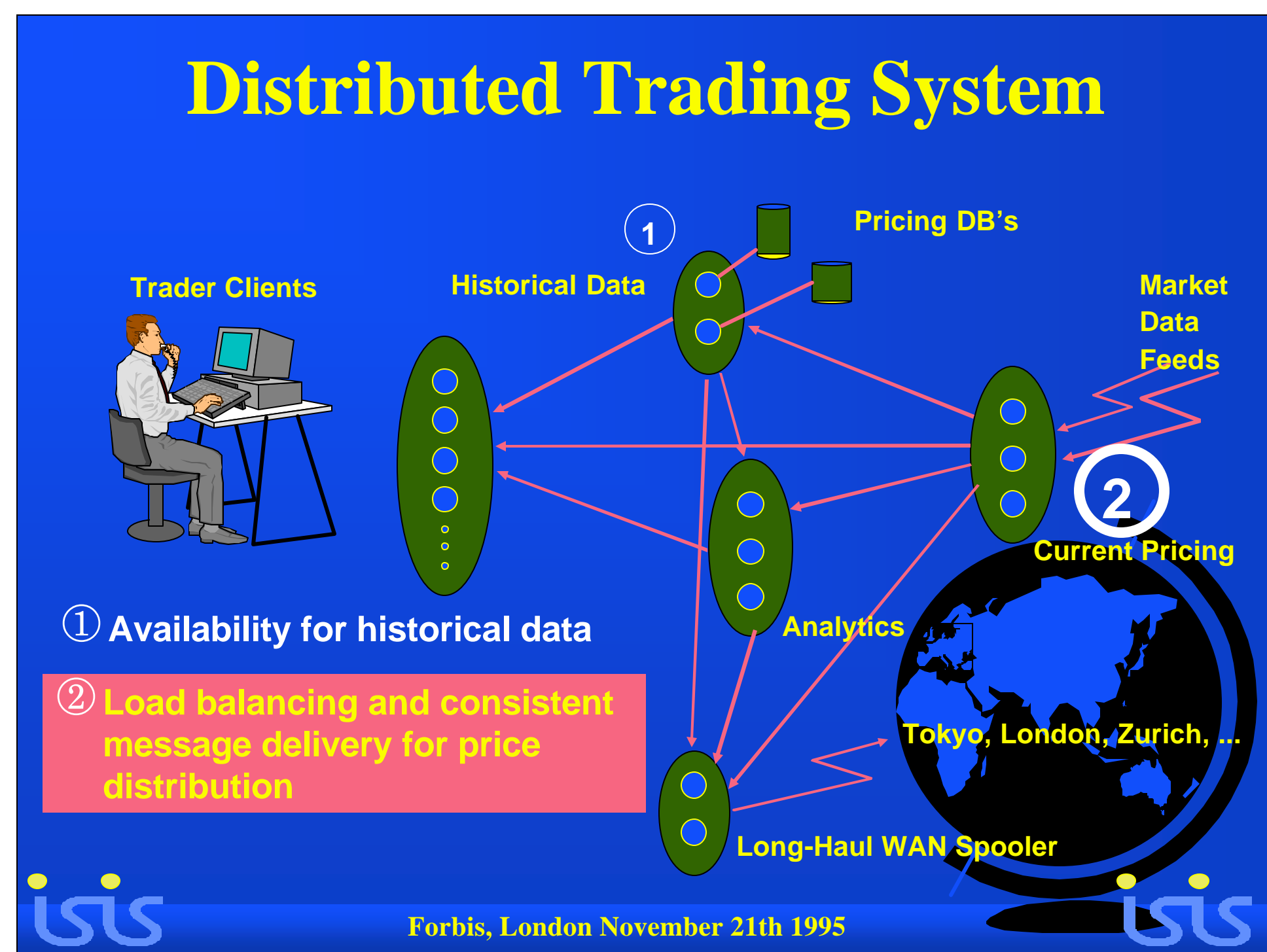


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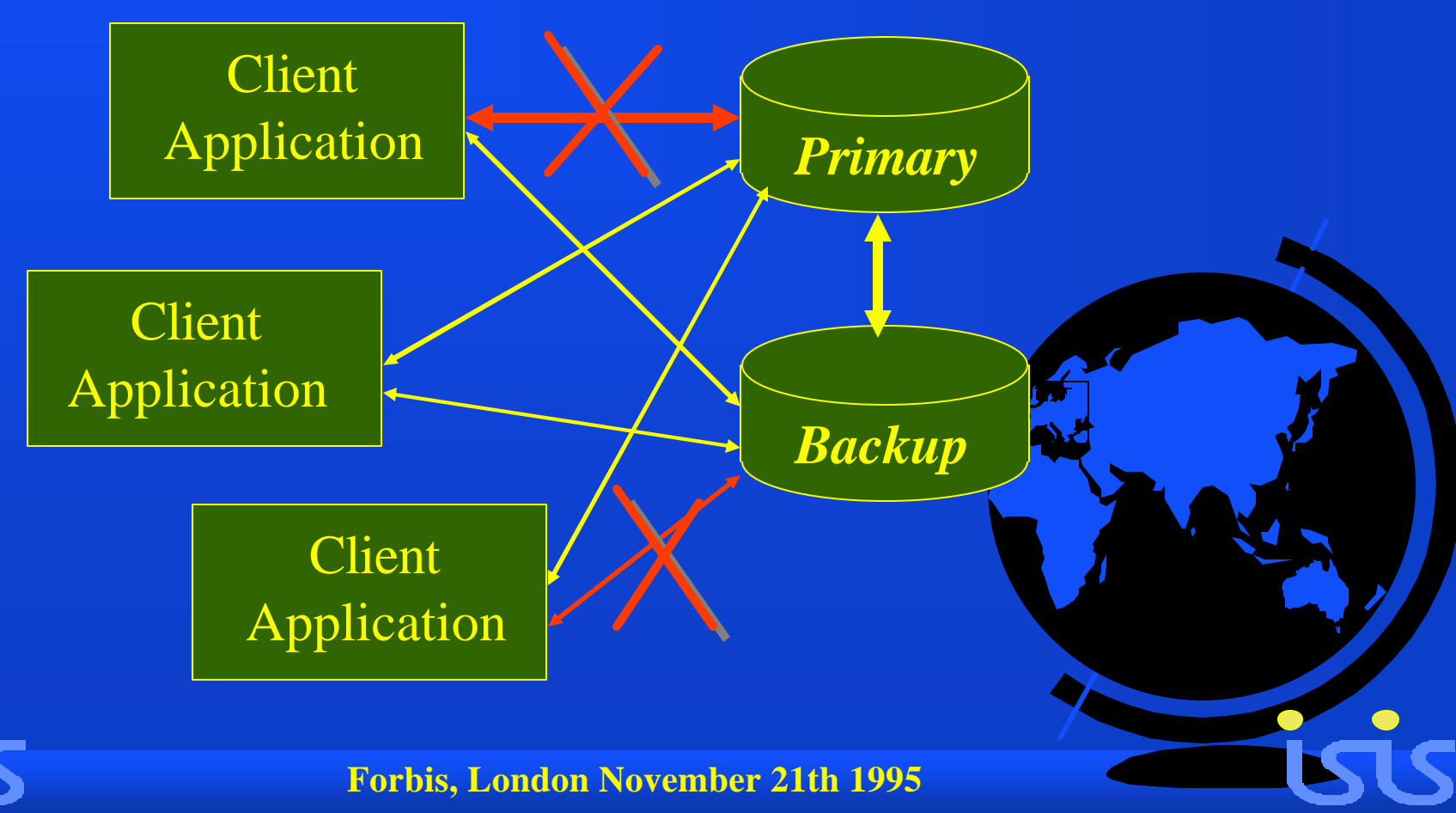


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Inconsistent failure reporting

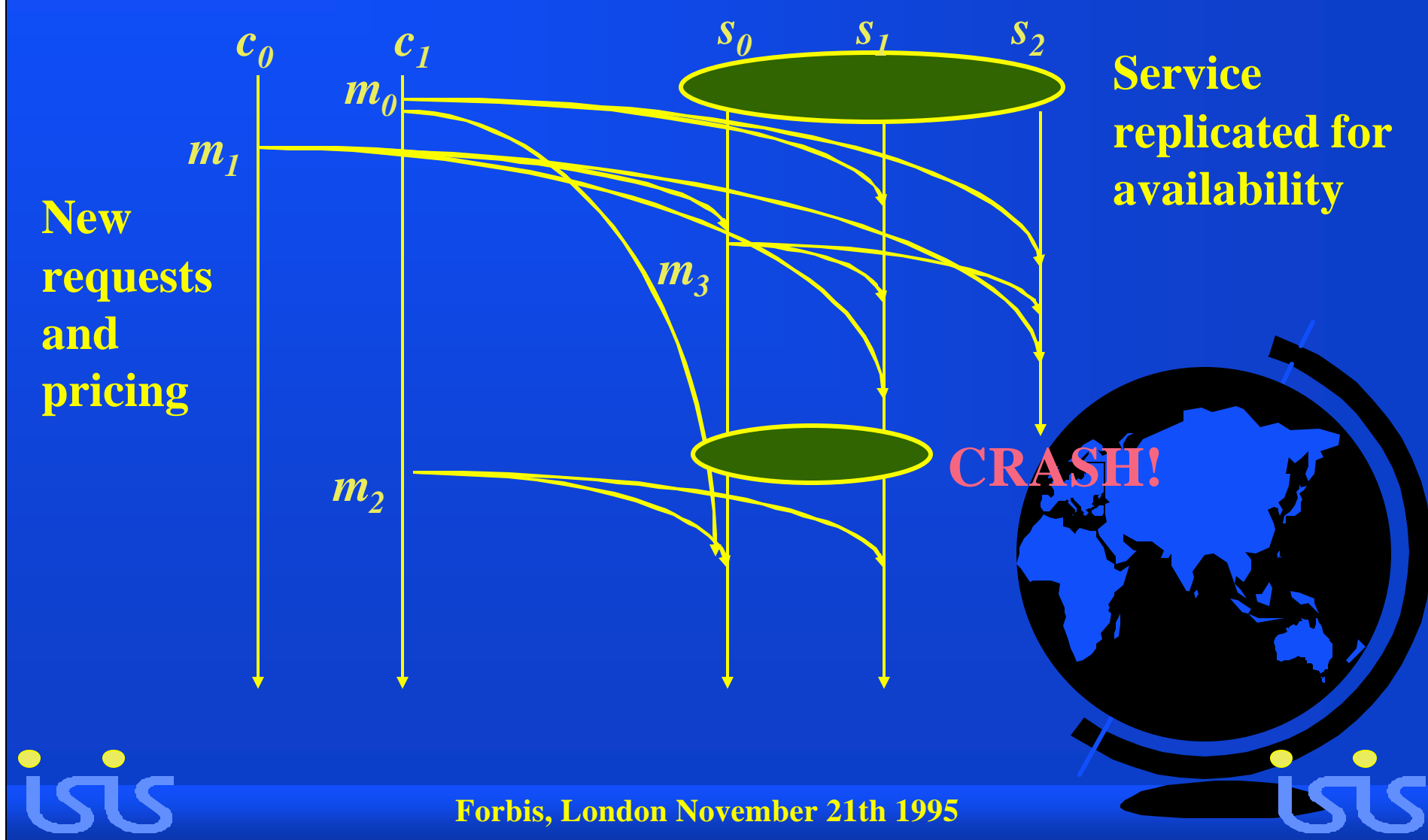
Who considers whom broken and why?



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Inconsistent event reporting



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Inconsistency causes problems

- ✦ Replicated data out of sync
- ✦ Locks not acquired or released, or deadlock
- ✦ Unable to balance load or subdivide work
- ✦ Can't implement primary/backup fault-tolerance algorithms
- ✦ Can't automate system management

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... limiting application reliability!

- ✦ Inconsistency is built into communication primitives in Unix, VMS, NT, Windows 95
- ✦ Applications built on such systems must live with inconsistency: they are unreliable and hard to manage

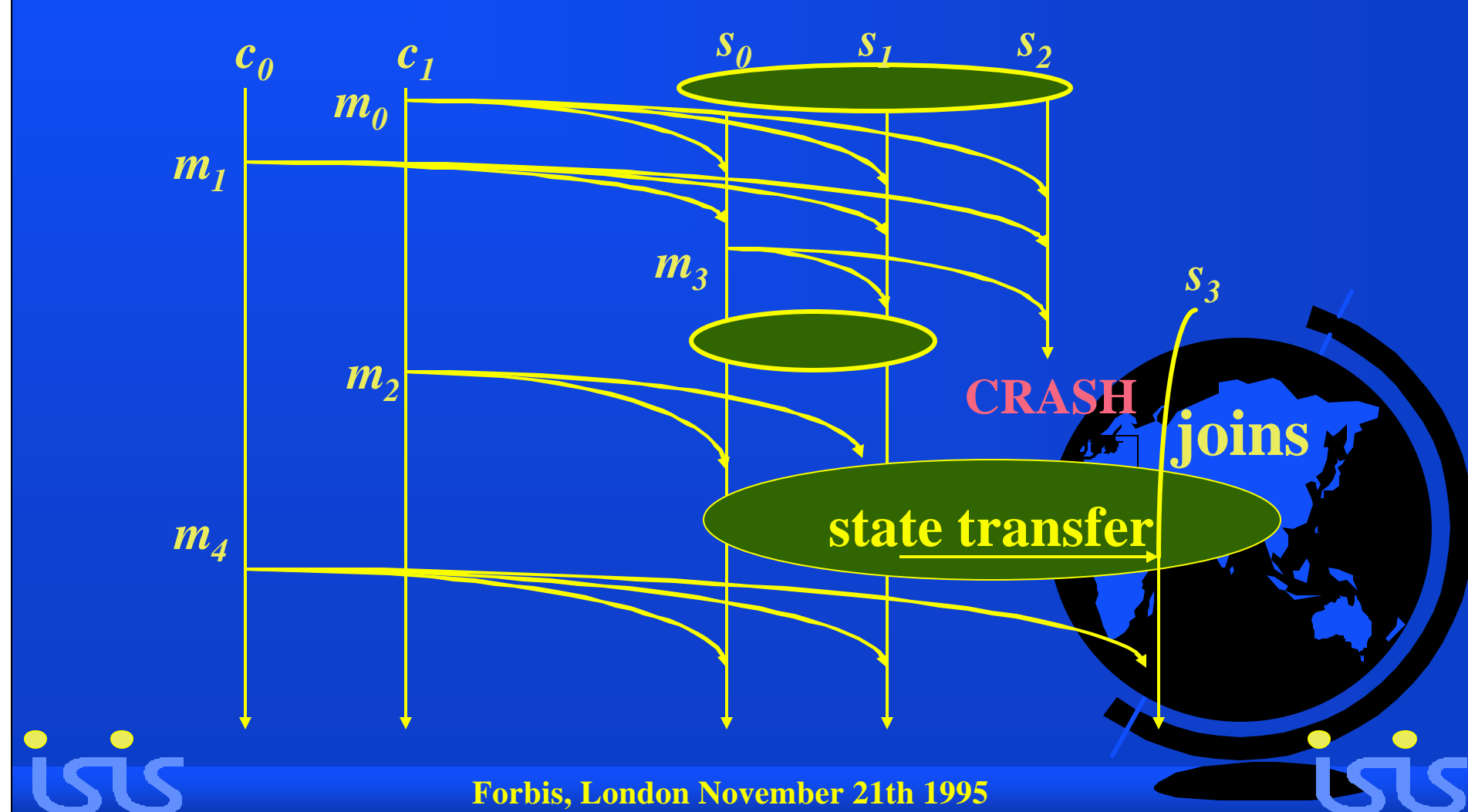
The key to Isis is a consistency mechanism:

Virtually Synchronous Process Groups

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Virtual Synchrony in Isis



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Consistency in Isis

- ✦ Built over UDP using proprietary protocols
- ✦ Consistent failure reporting
- ✦ Group members see events in same order
- ✦ State transfer provided to joining member

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Isis SDK turns model into "tools"

- ✦ API for group join, multicast, state transfer
- ✦ Replicated data and synchronization
- ✦ Coordinated, load-balanced request execution
- ✦ Fault-tolerance through software
- ✦ Self-management interfaces
- ✦ Hardware multicast for big fanouts, point to point for small groups



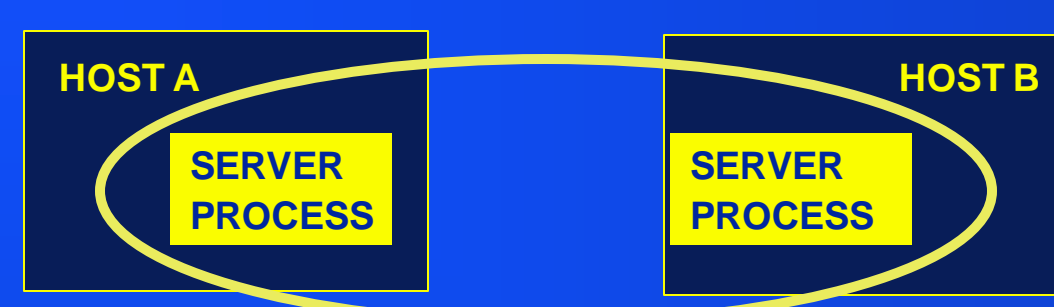
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Isis Software Developer's Toolkit



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Isis Software Developer's Toolkit



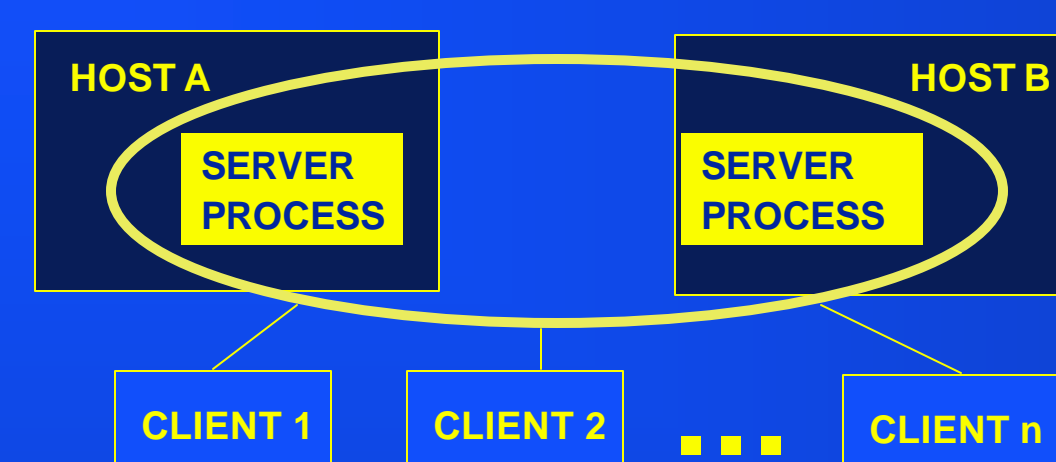
Process Group technology

- ✦ Server processes join a group to form a service



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Isis Software Developer's Toolkit



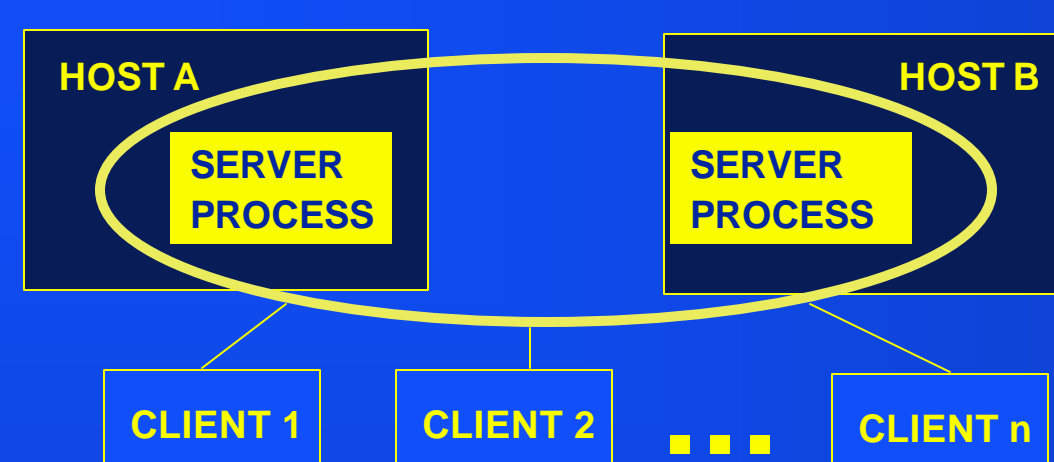
Process Group technology

- ✦ Server processes join a group to form a service
- ✦ Client requests are delivered to the group with Isis reliable group messaging



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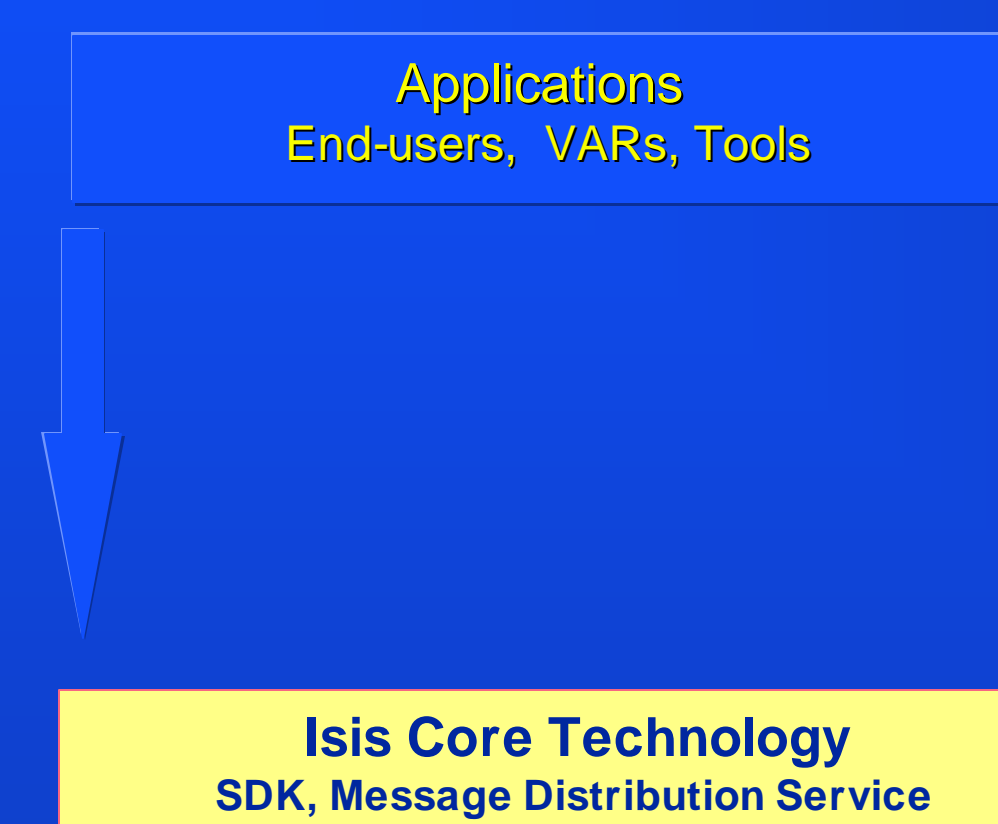
Process Group technology

- ✦ Server processes join a group to form a service
- ✦ Client requests are delivered to the group with Isis reliable group messaging
- ✦ Execution can be replicated, load-balanced
- ✦ Isis message and failure consistency ensures correctness of coordinated actions

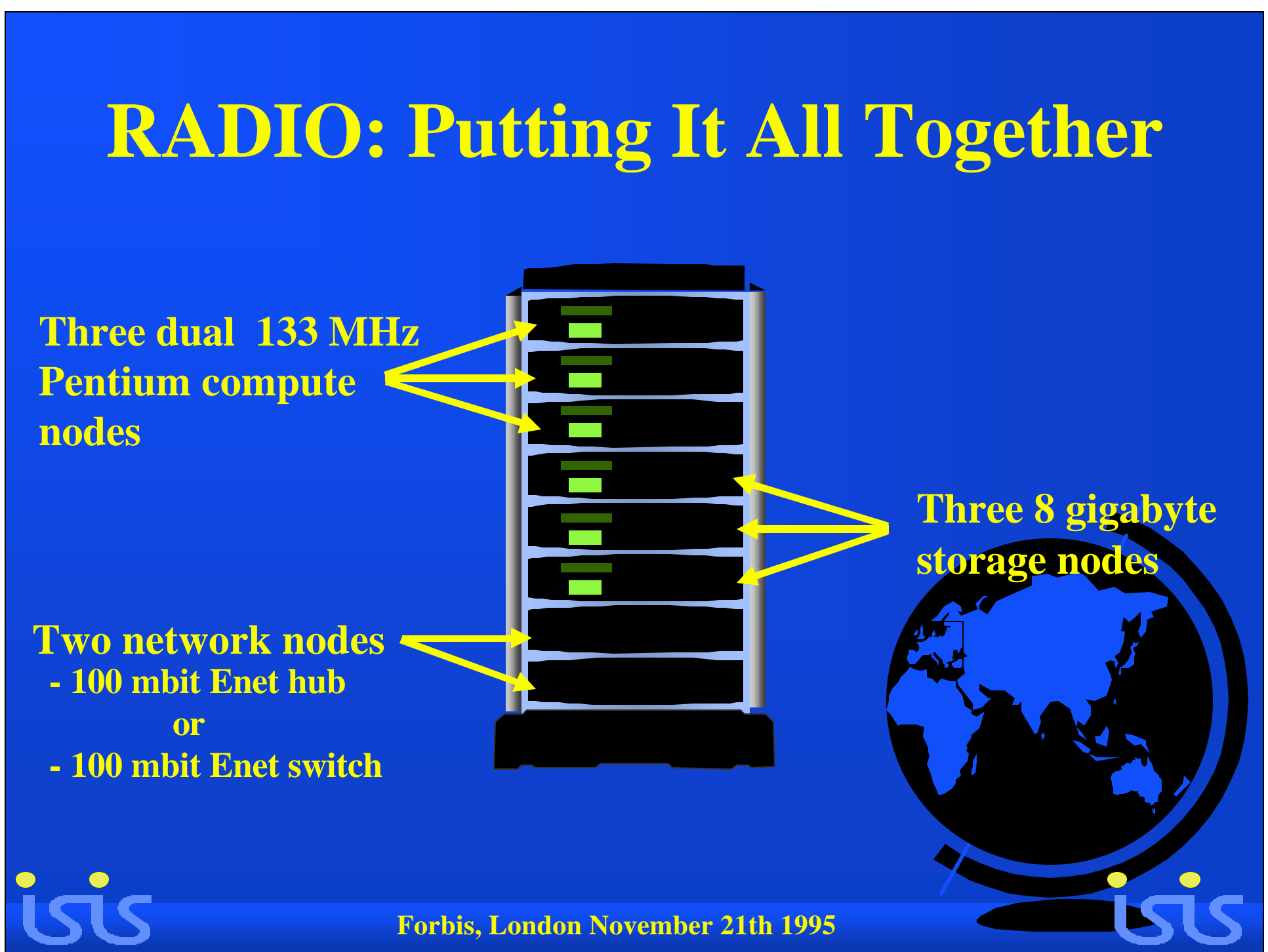


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Isis Product Set



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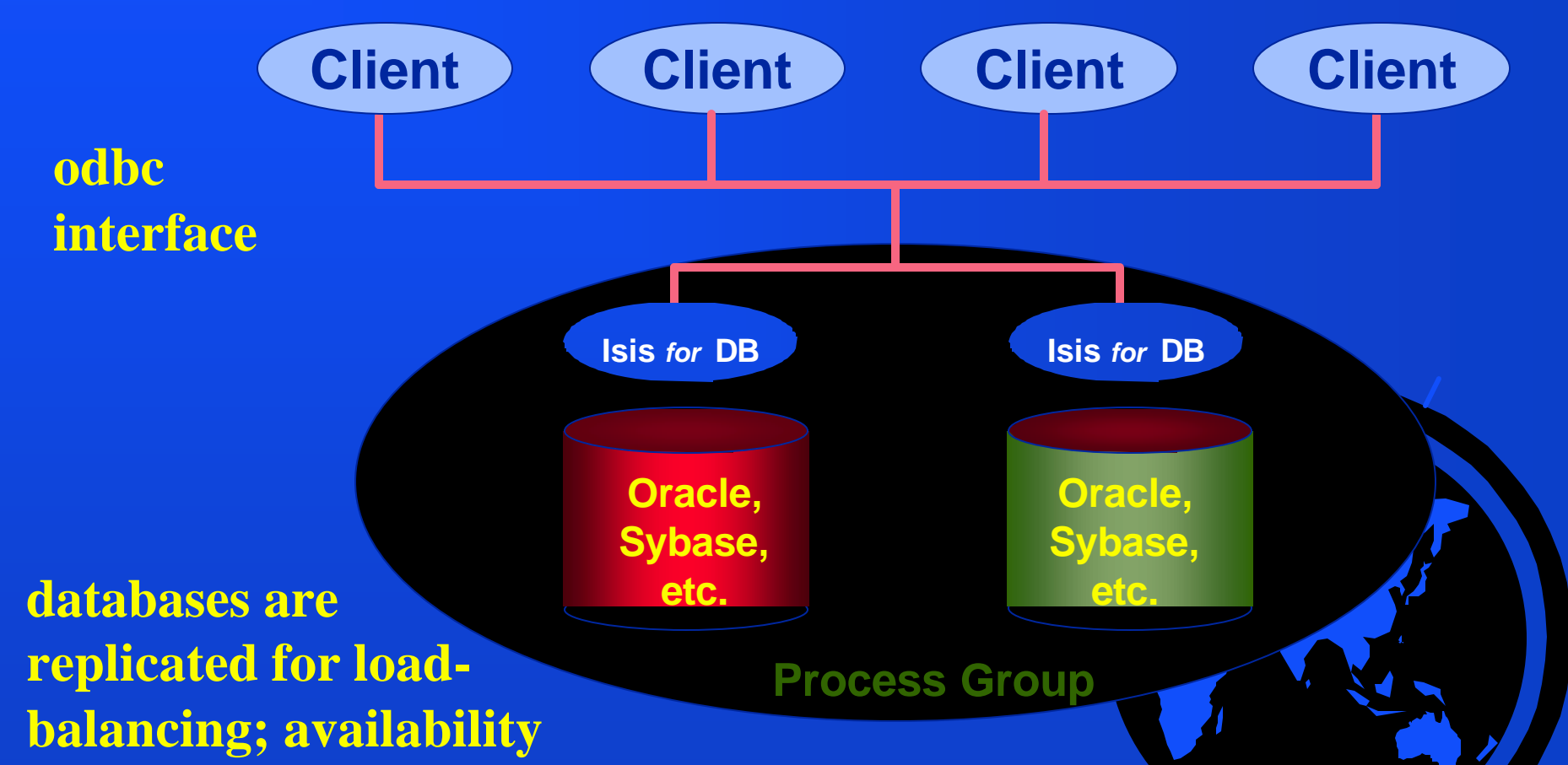
Radio and Isis Technology

- ✦ Highest availability PC cluster server hosting Isis availability technology and products.
- ✦ Easily serviced, hot-pluggable, self-managed.
- ✦ Many levels of availability: shrink-wrap NT or Unixware application benefit, if desired use Isis active replication for continuous availability.
- ✦ Seamlessly integrated with Isis on your network and Isis applications on your workstations.



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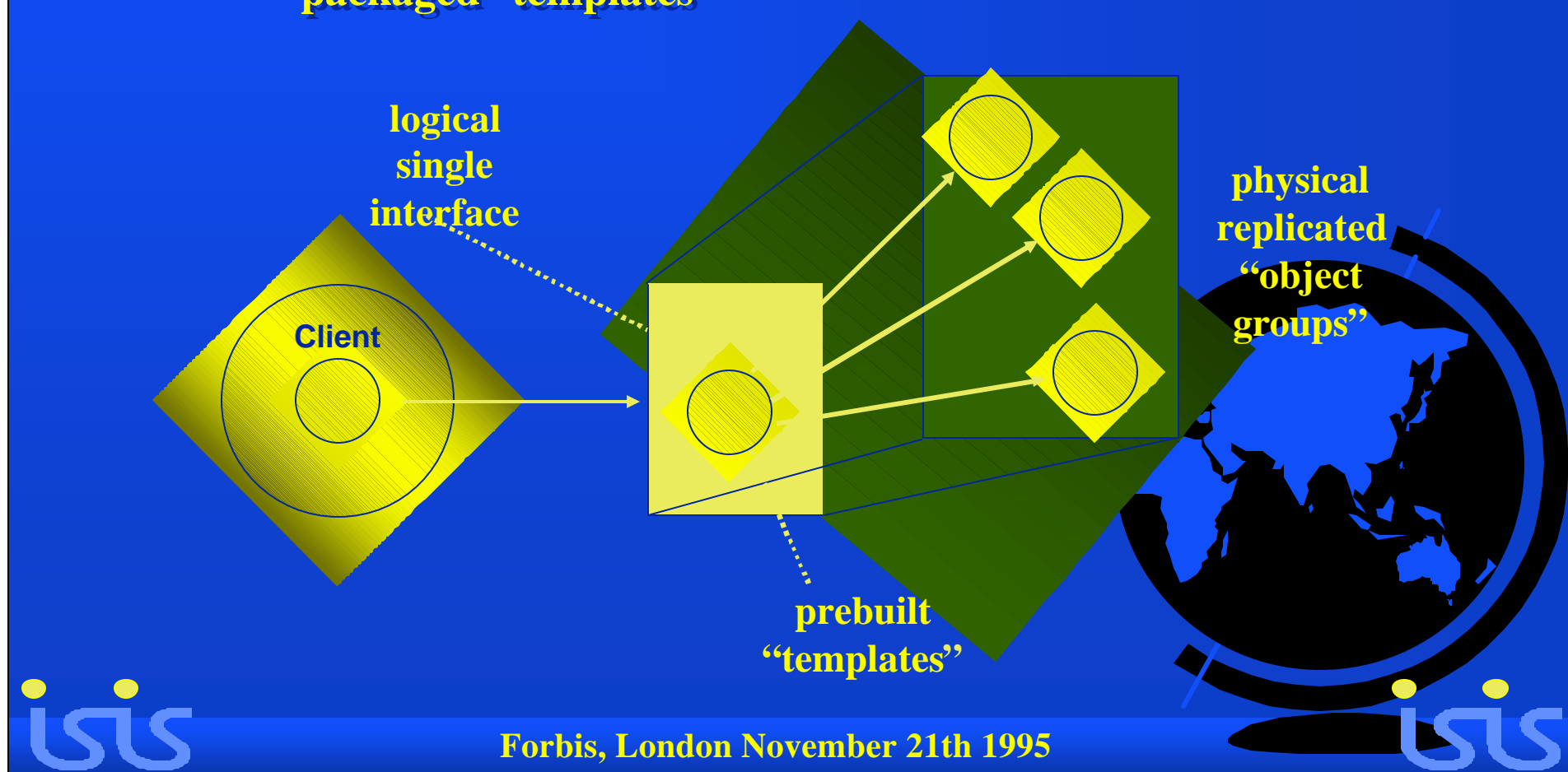
Isis for Database



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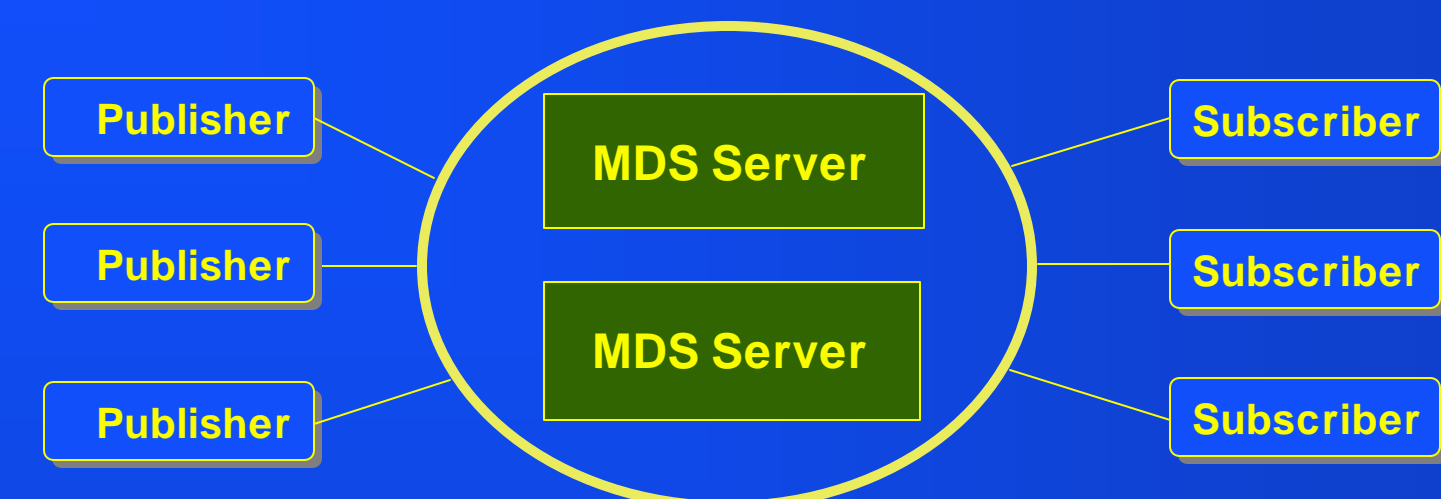
Orbix+Isis - The Big Picture

- ✦ Client uses single logical interface (CORBA IDL)
- ✦ That interface is implemented by multiple replicated objects ("object group")
- ✦ Mapping of single interface to object group is provided by packaged "templates"



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Isis Message Distribution Service

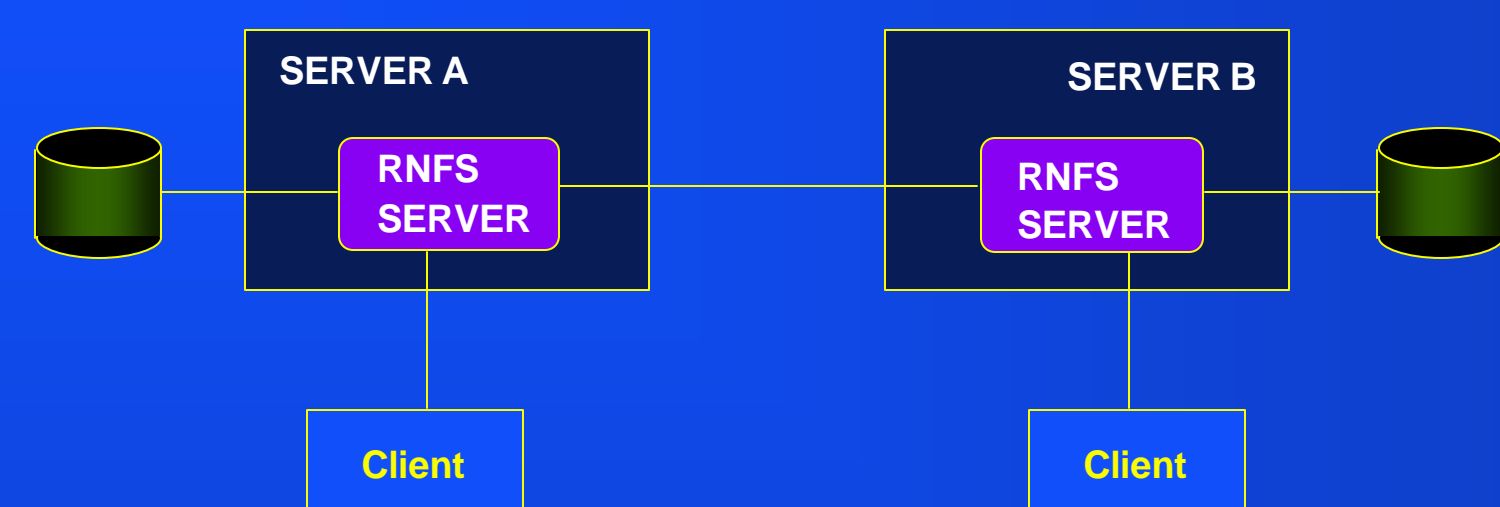


- ✦ Publishers send messages by subject
- ✦ Subscribers register for subjects of interest
- ✦ Isis MDS provides guaranteed message delivery
- ✦ MDS maintains persistent message streams for subscribers that leave and return



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Isis Reliable Network File System



- ✦ Replicates NFS files across multiple servers
- ✦ Removes single points of failure
- ✦ Automatically recovers from server failures
- ✦ Application program, NFS server unchanged



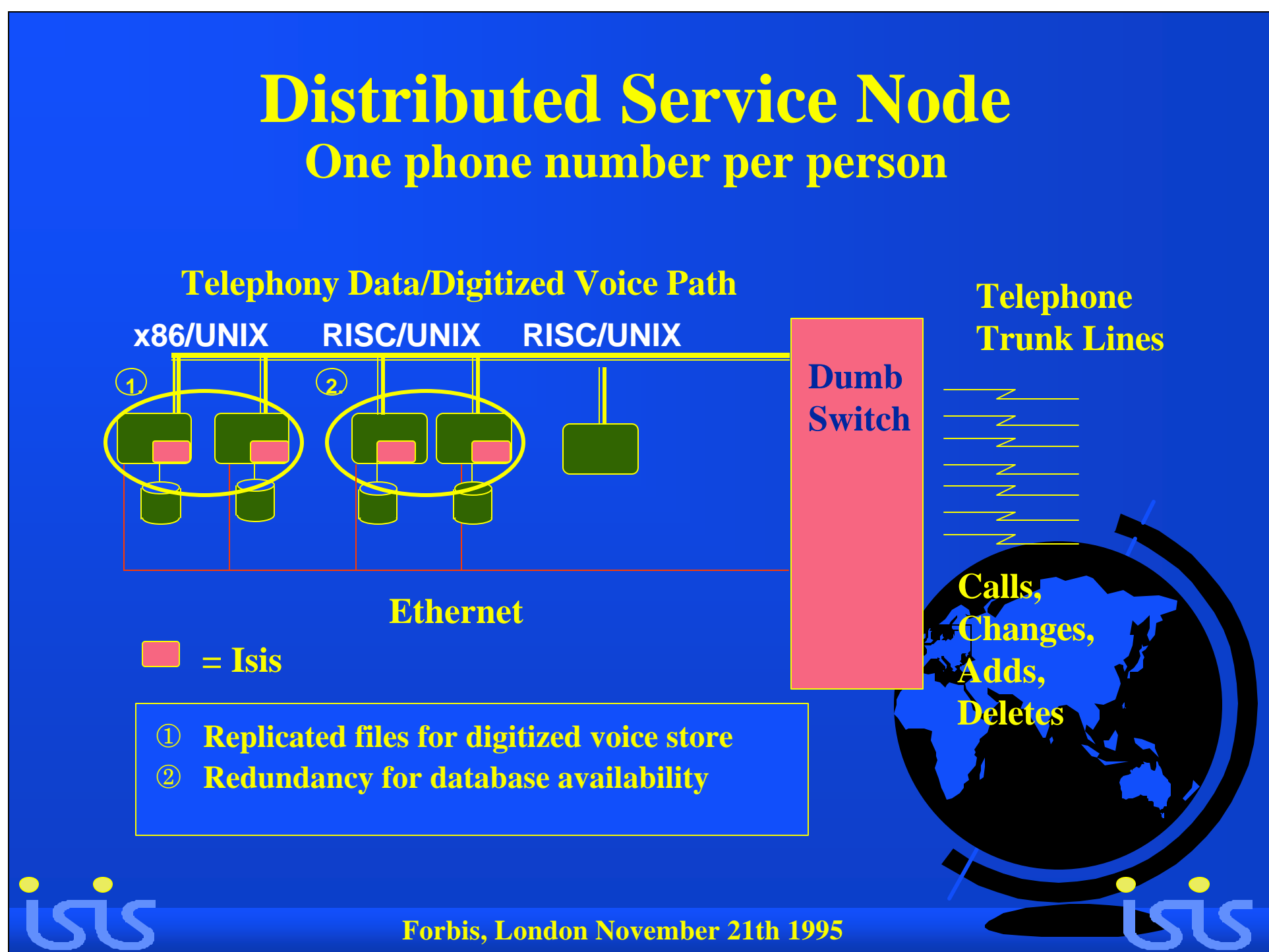
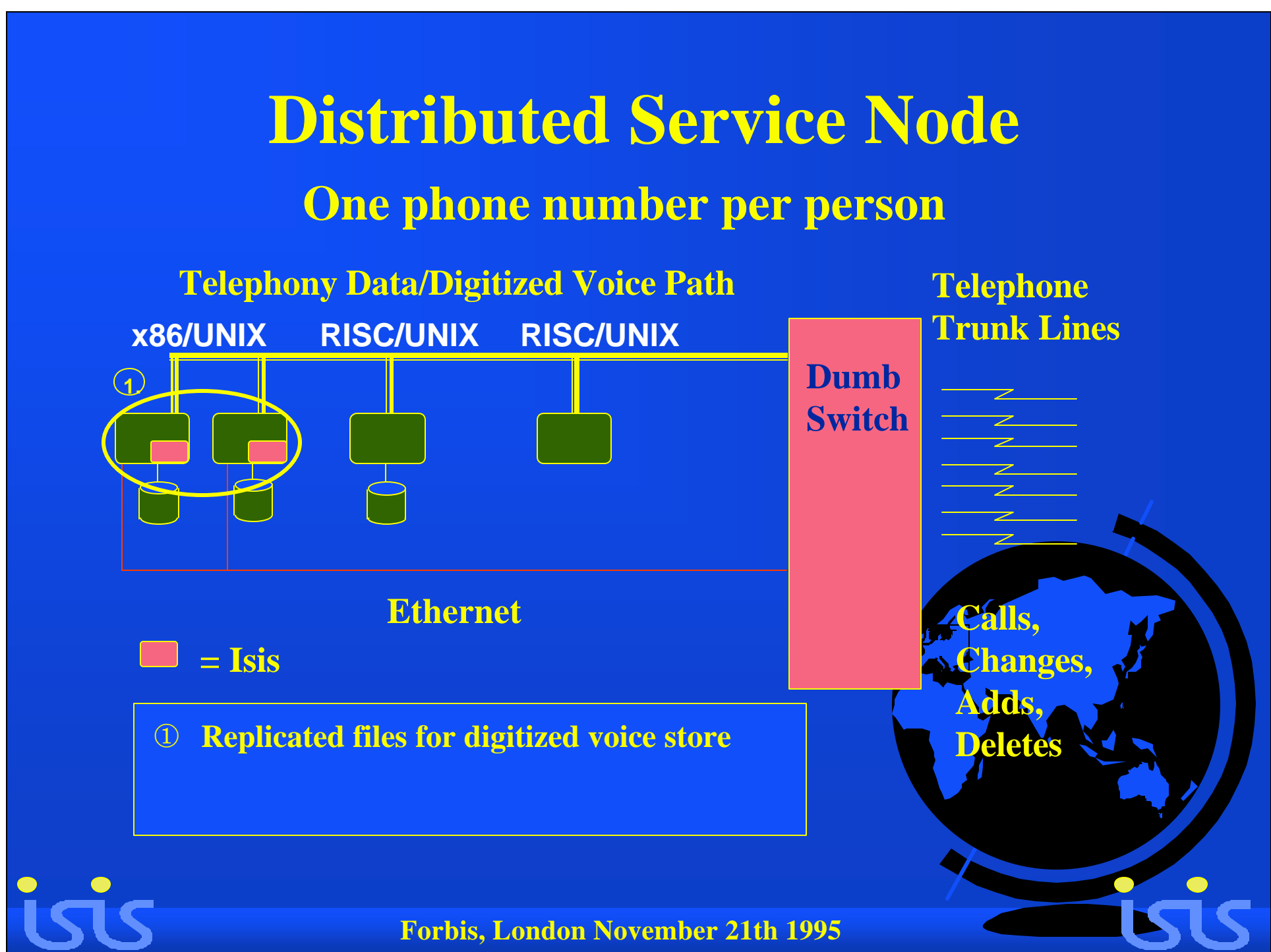
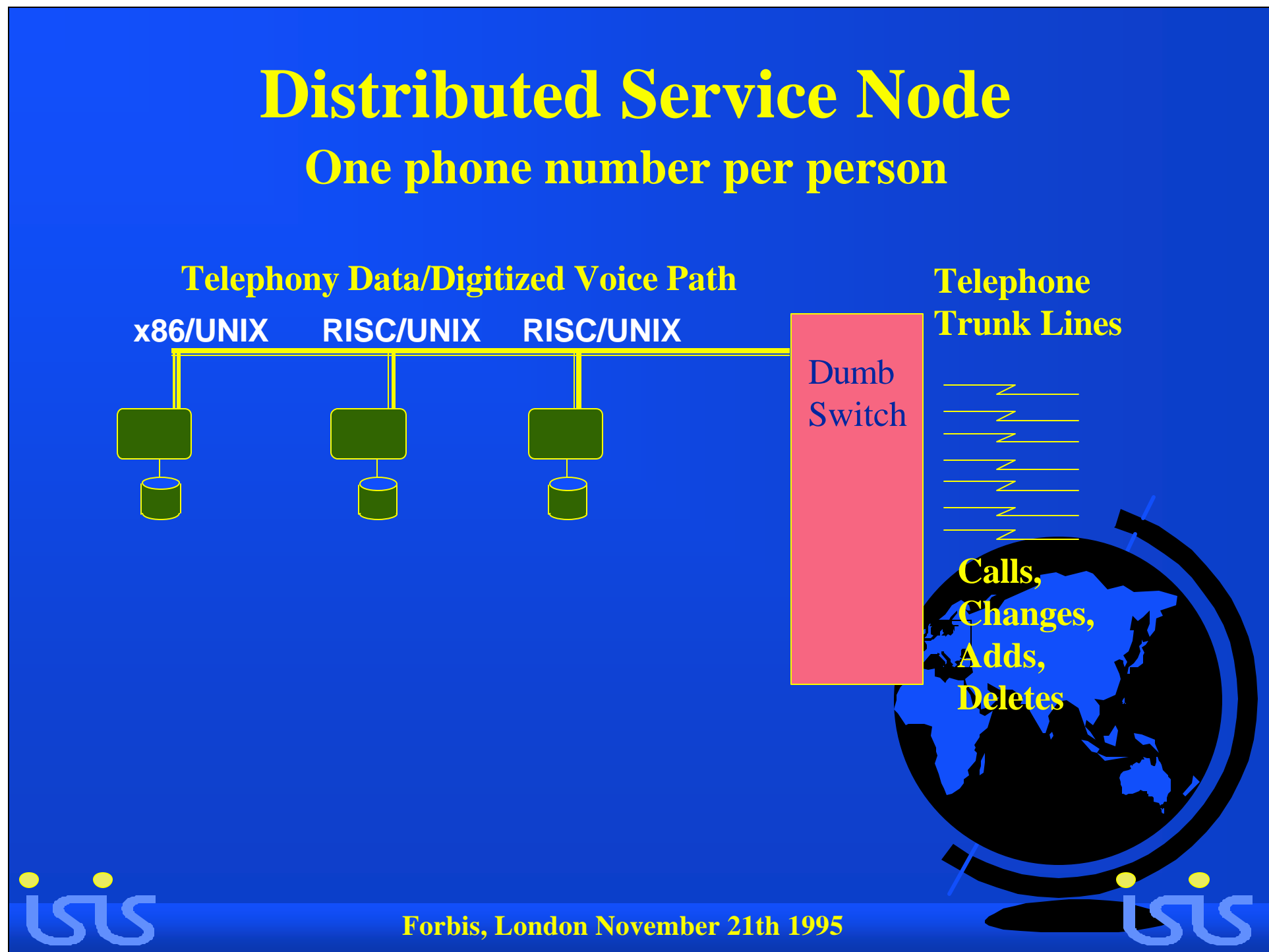
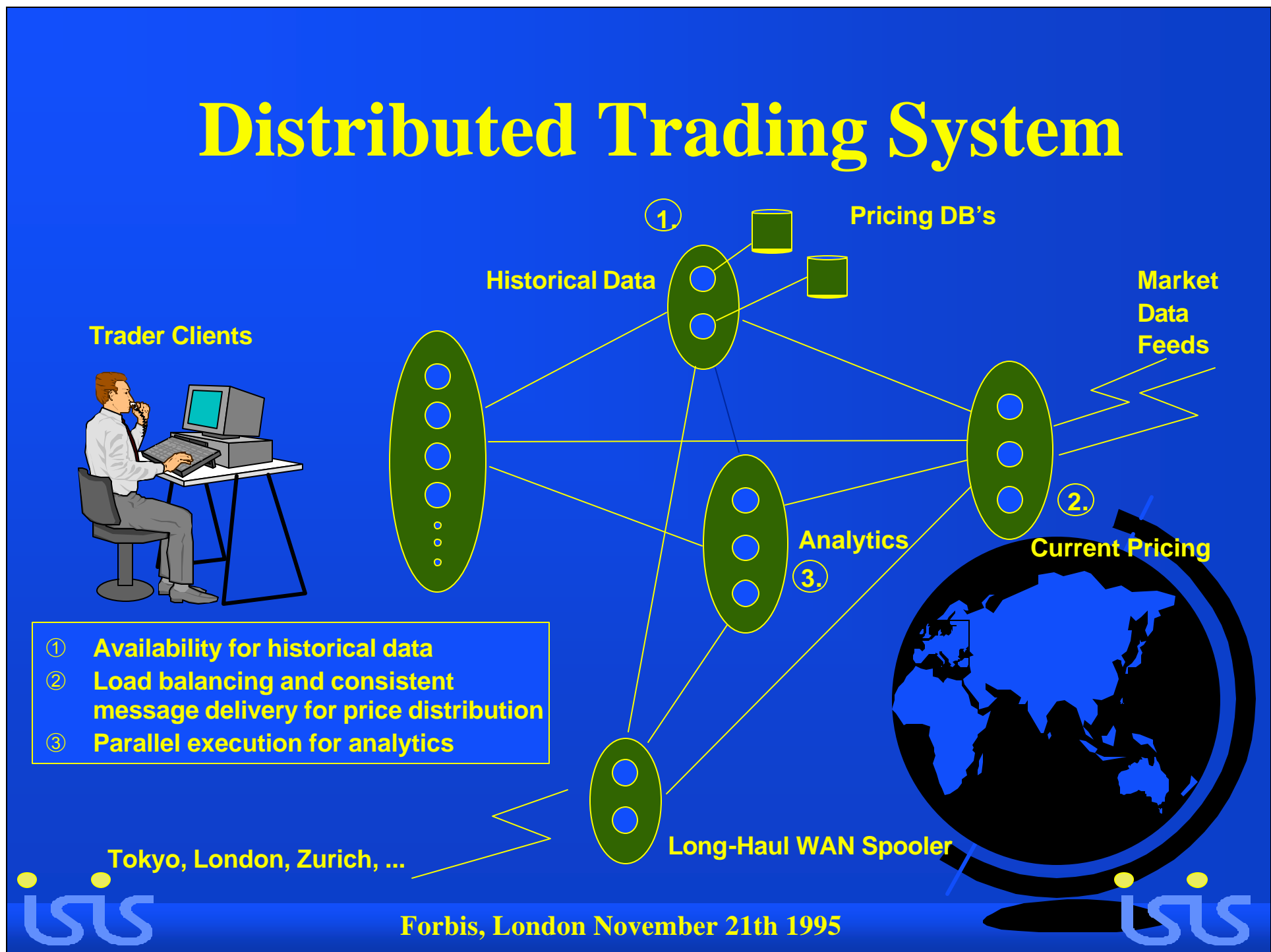
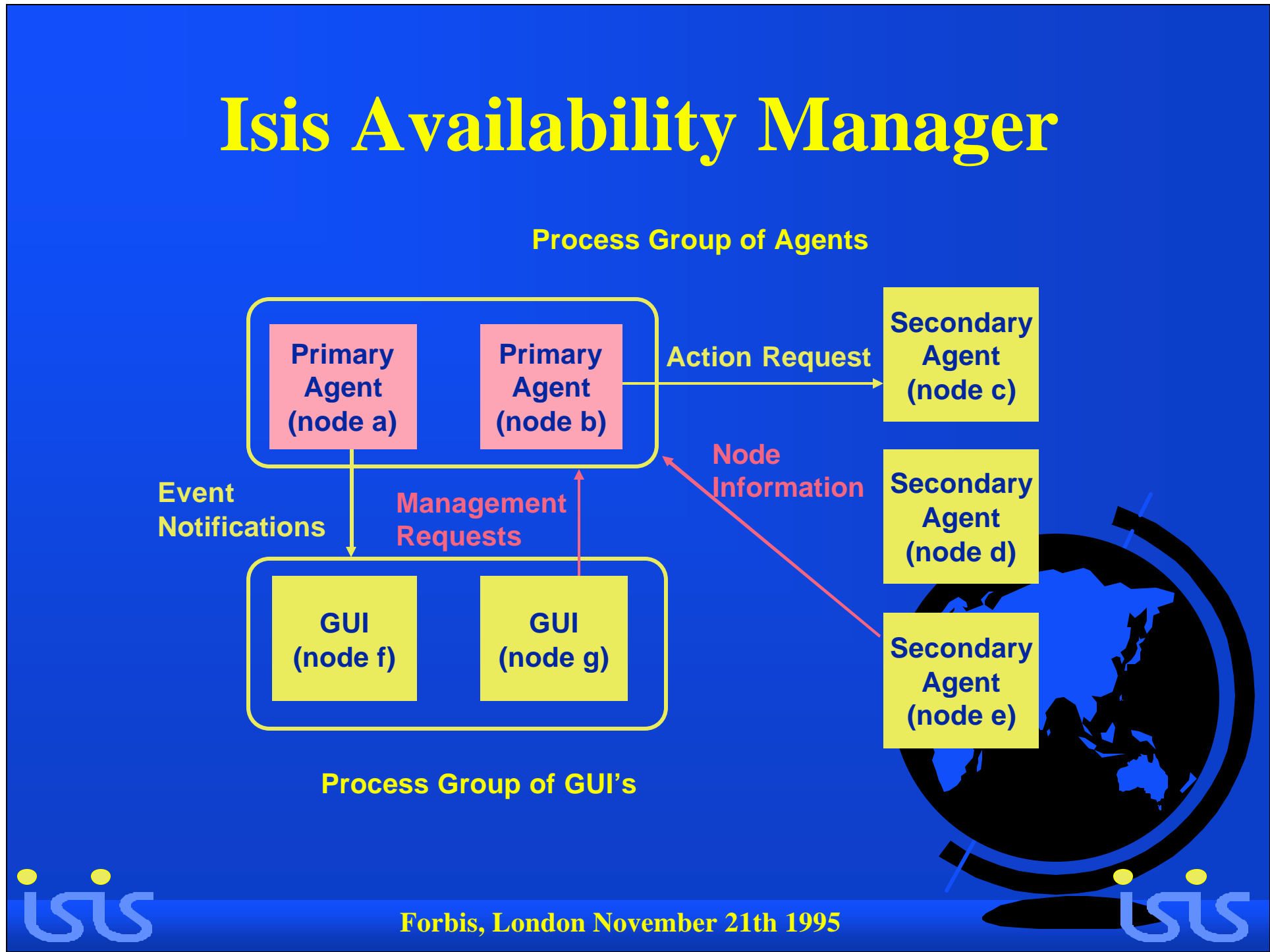
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Isis Availability Manager

- ✦ Fault-tolerant infrastructure for supervising applications and critical servers
- ✦ Simple graphical interface is easy to use
- ✦ Fully customizable with rule-based scripts
- ✦ Sensor/action model instruments your application in natural ways that you define
- ✦ Automatically restarts critical servers

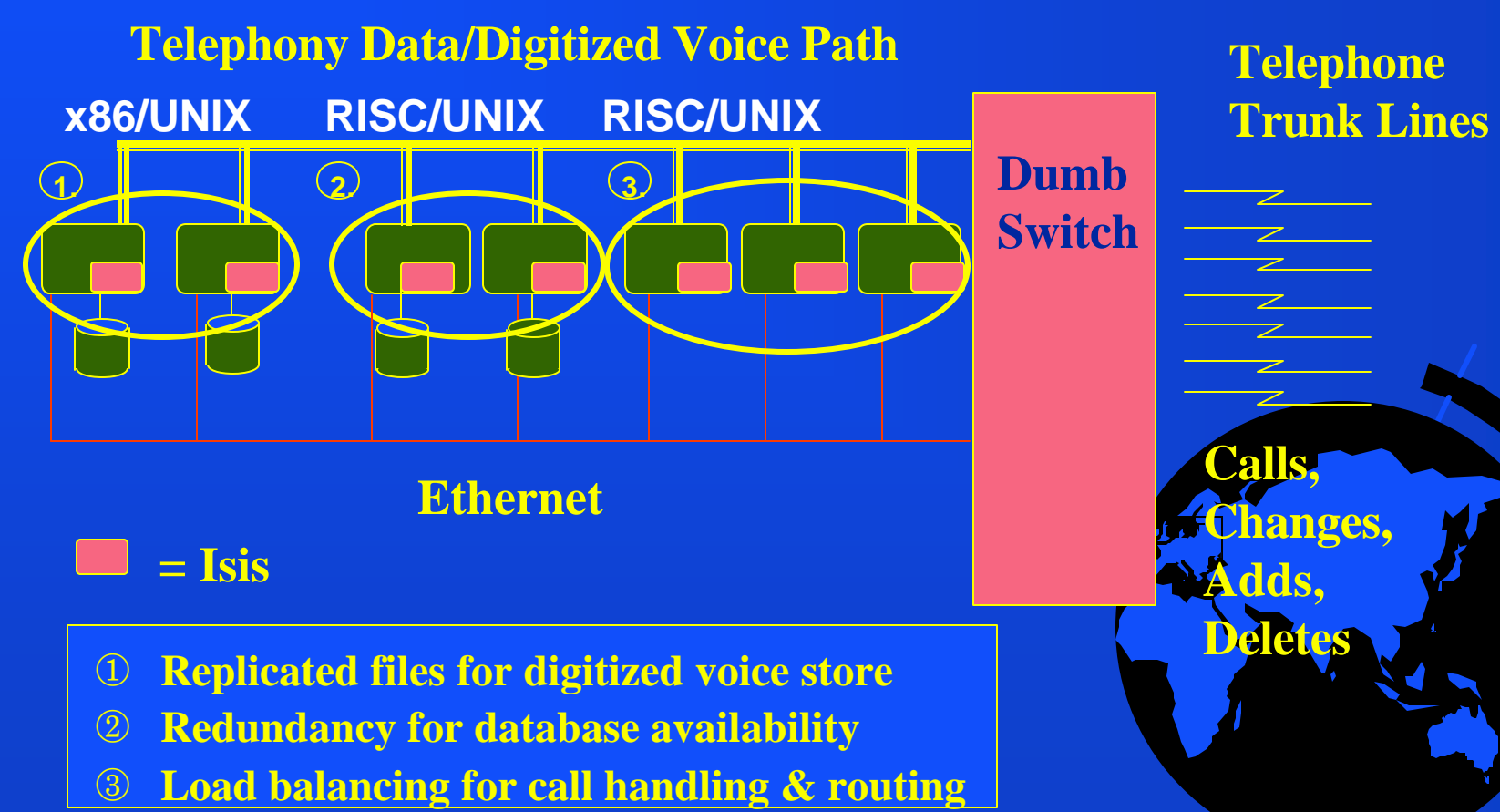


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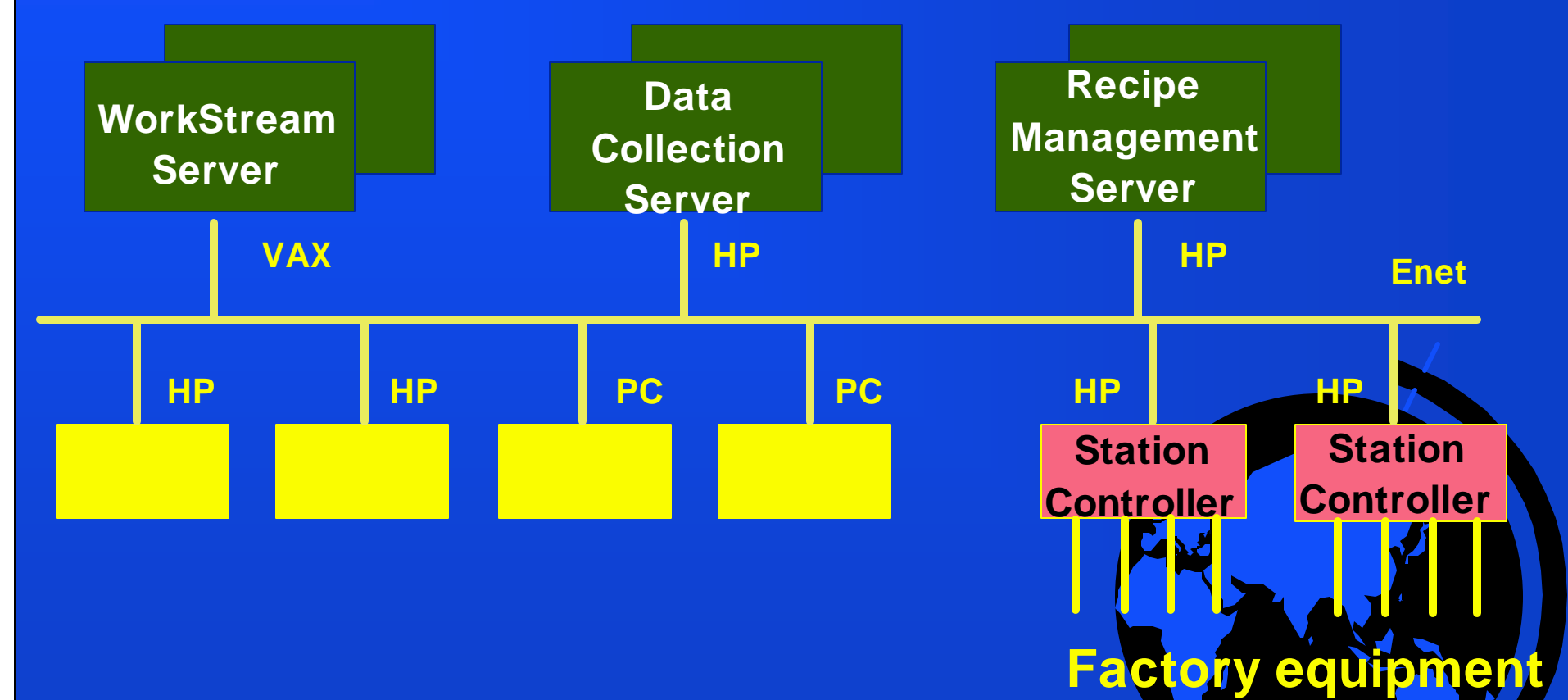
Distributed Service Node

One phone number per person



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Shop Floor Process Control Example



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Supported Platforms

Major

- SUN OS
- SOLARIS
- HP/UX
- IBM AIX
- WINDOWS NT

Other

- WIN 3.1
- ALPHA OSF/1
- FTX
- VMS
- SGI
- PYRAMID
- SEQUENT



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Isis Market Positioning

- ✦ Addresses application-level problems of distributed computing:
Reliability Scaling Consistency
- ✦ Active replication versus restart-recovery
- ✦ Application availability versus server availability
- ✦ Vendor independent and portable
- ✦ Committed to integration and standards



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