The Tempestuous Future of Computing – Every Cloud Engenders *not* a Storm

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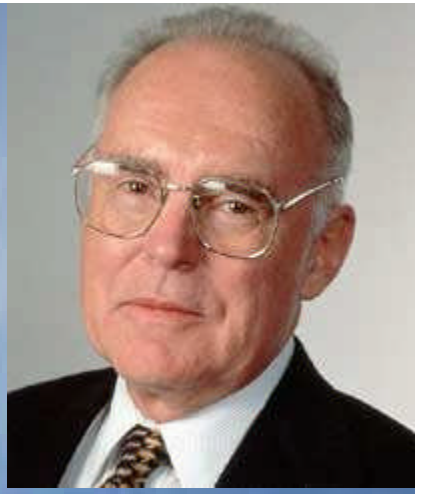
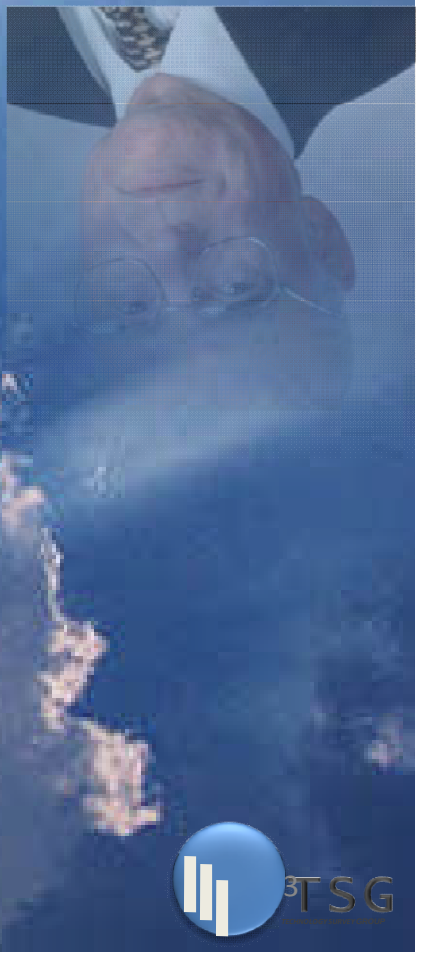
Agenda

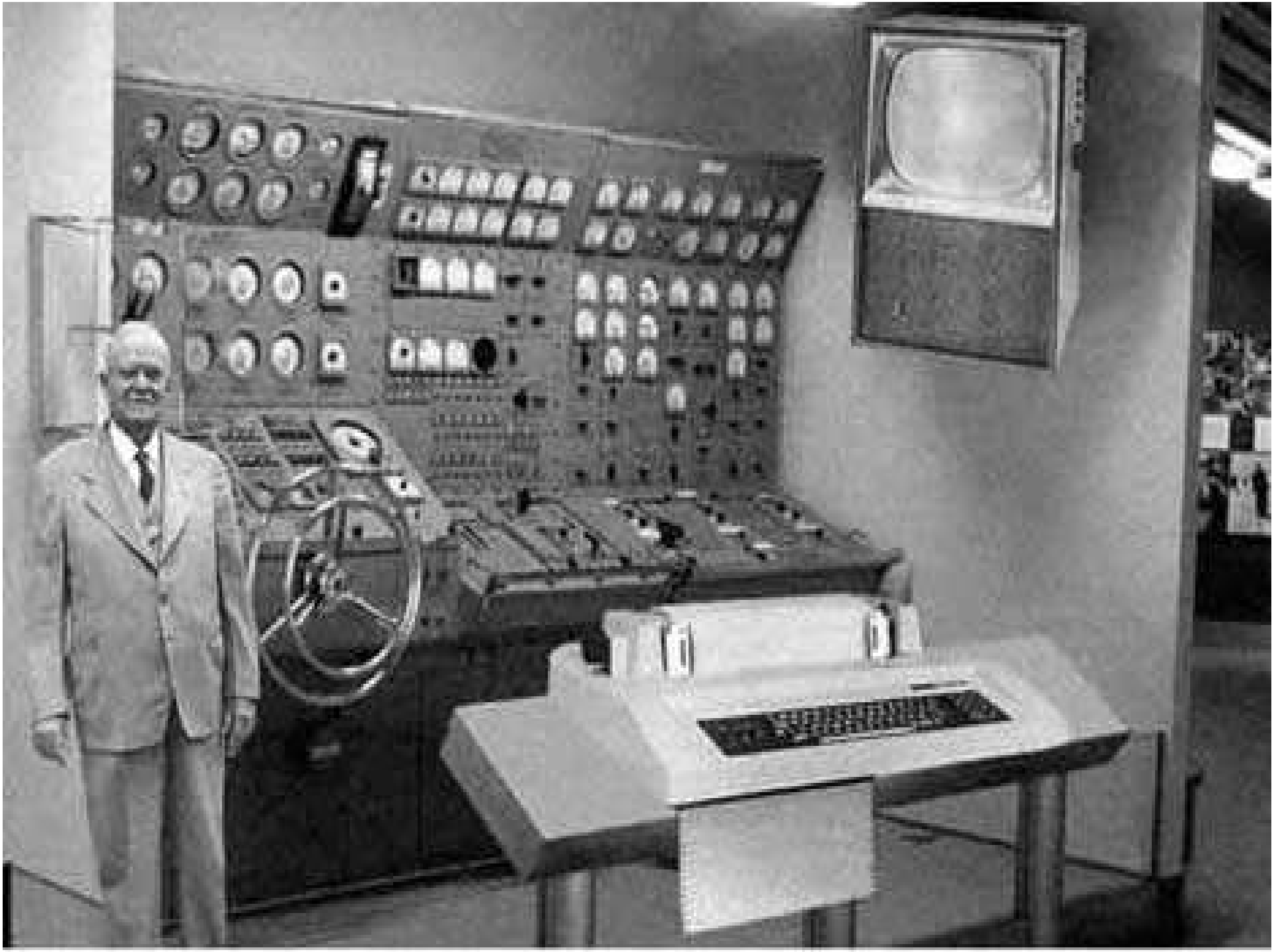
- What is the future of computing?
- Interfaces and Applications
- Ubiquity
- Cloud Computing / Services / Architectures
- Quantum Computing
- DNA/Molecular Computing
- Security, Reliability, and Trust
- Conclusion

Moore's Law: In 1965 Gordon Moore, co-founder of Intel, stated that the number of transistors per square inch on integrated circuits had doubled every year since the integrated circuit was invented. Moore predicted that this trend would continue for the foreseeable future…



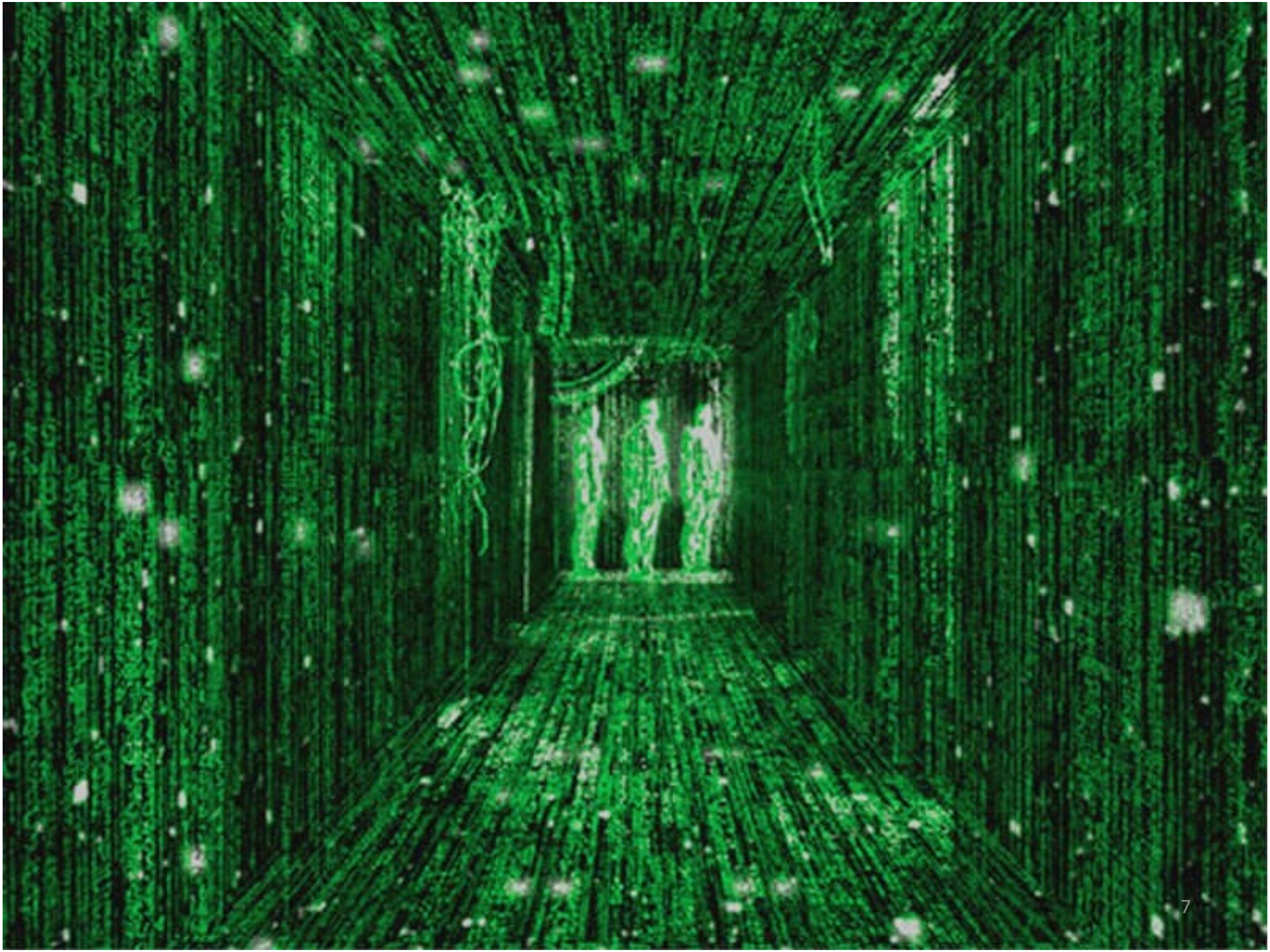


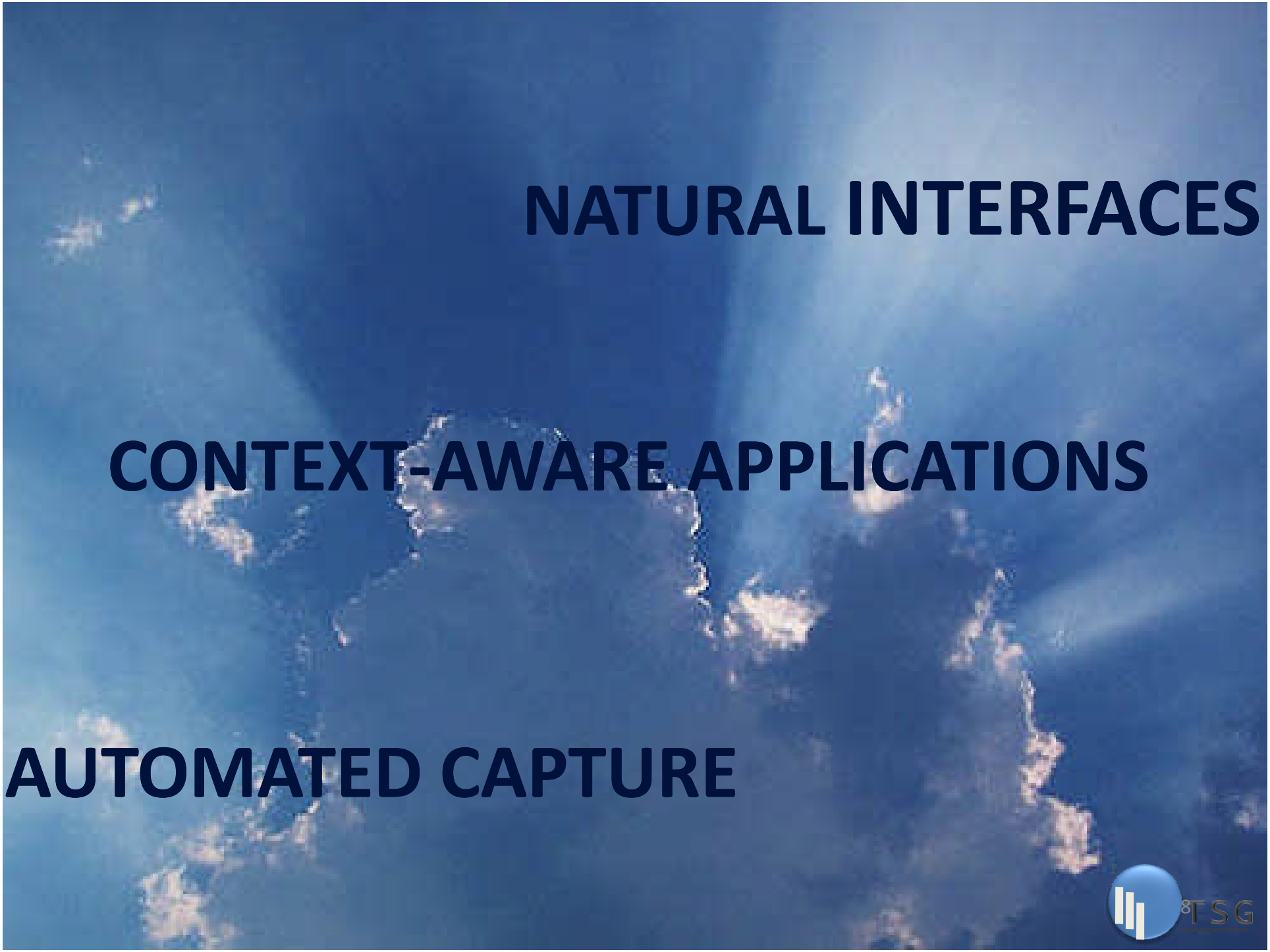
What is the future of Computing?



"640K ought to be enough for *anybody*

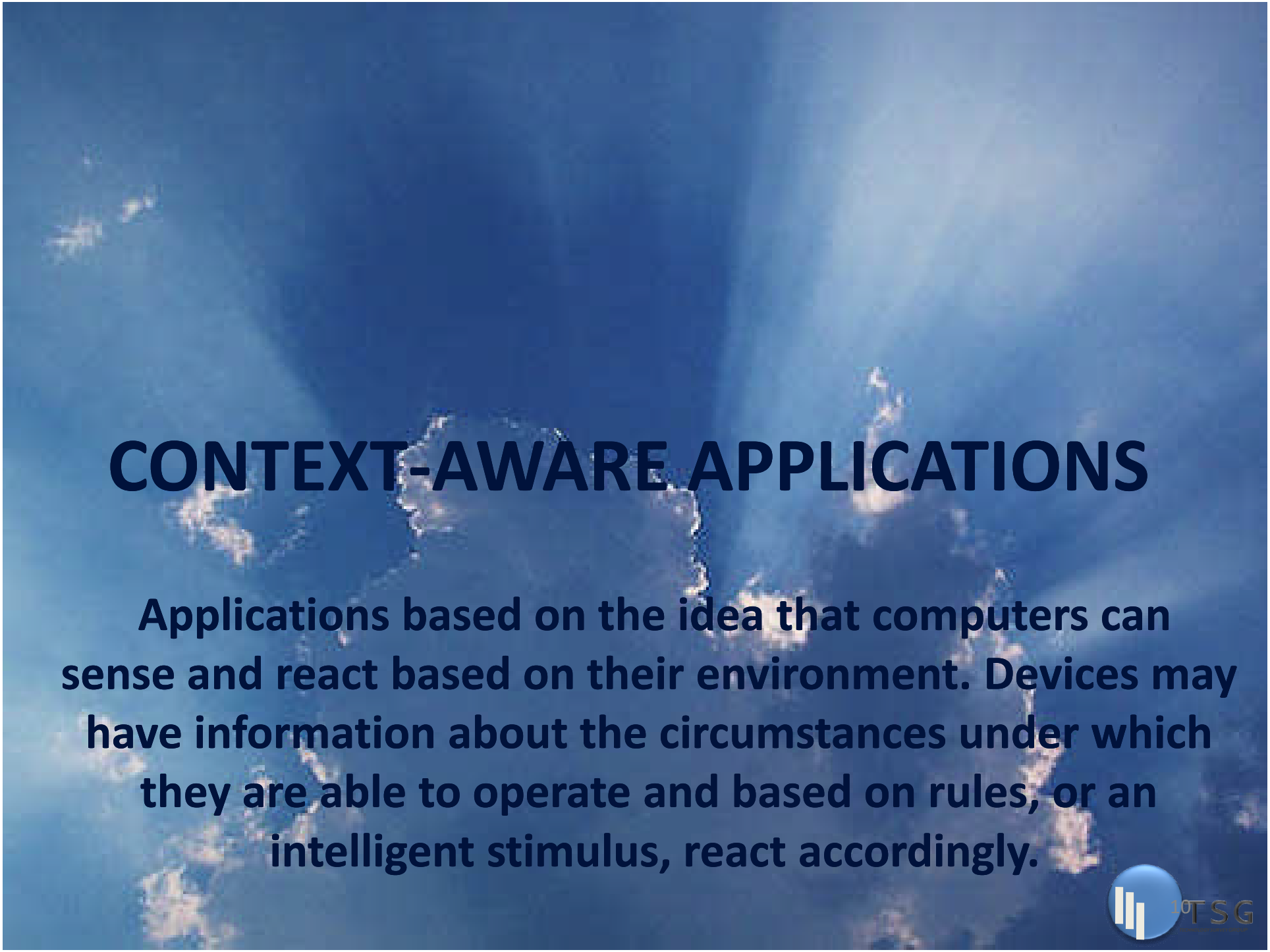
Bill Gates, 1981

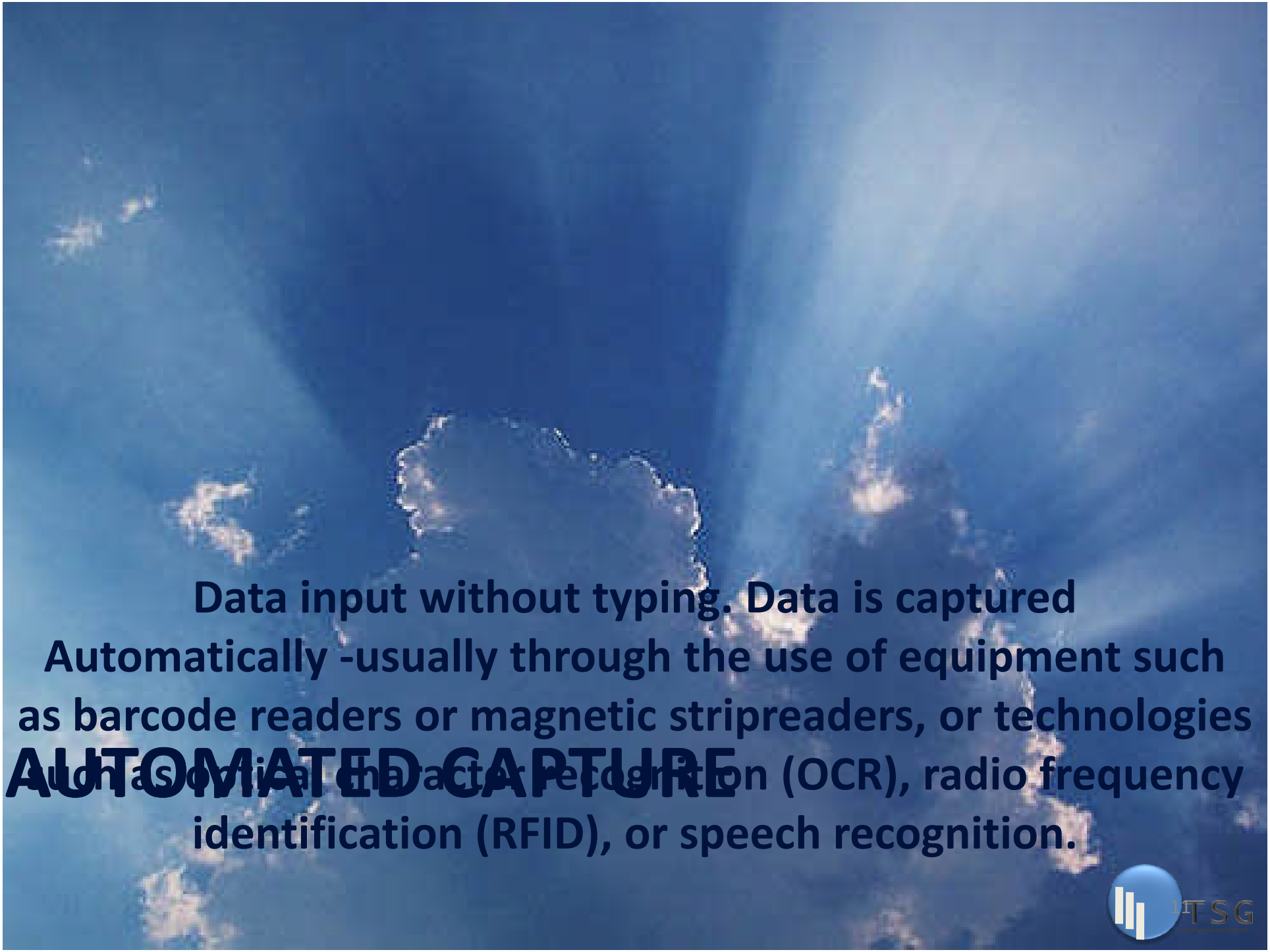



NATURAL INTERFACES
CONTEXT-AWARE APPLICATIONS
AUTOMATED CAPTURE
TSG

NATURAL INTERFACES

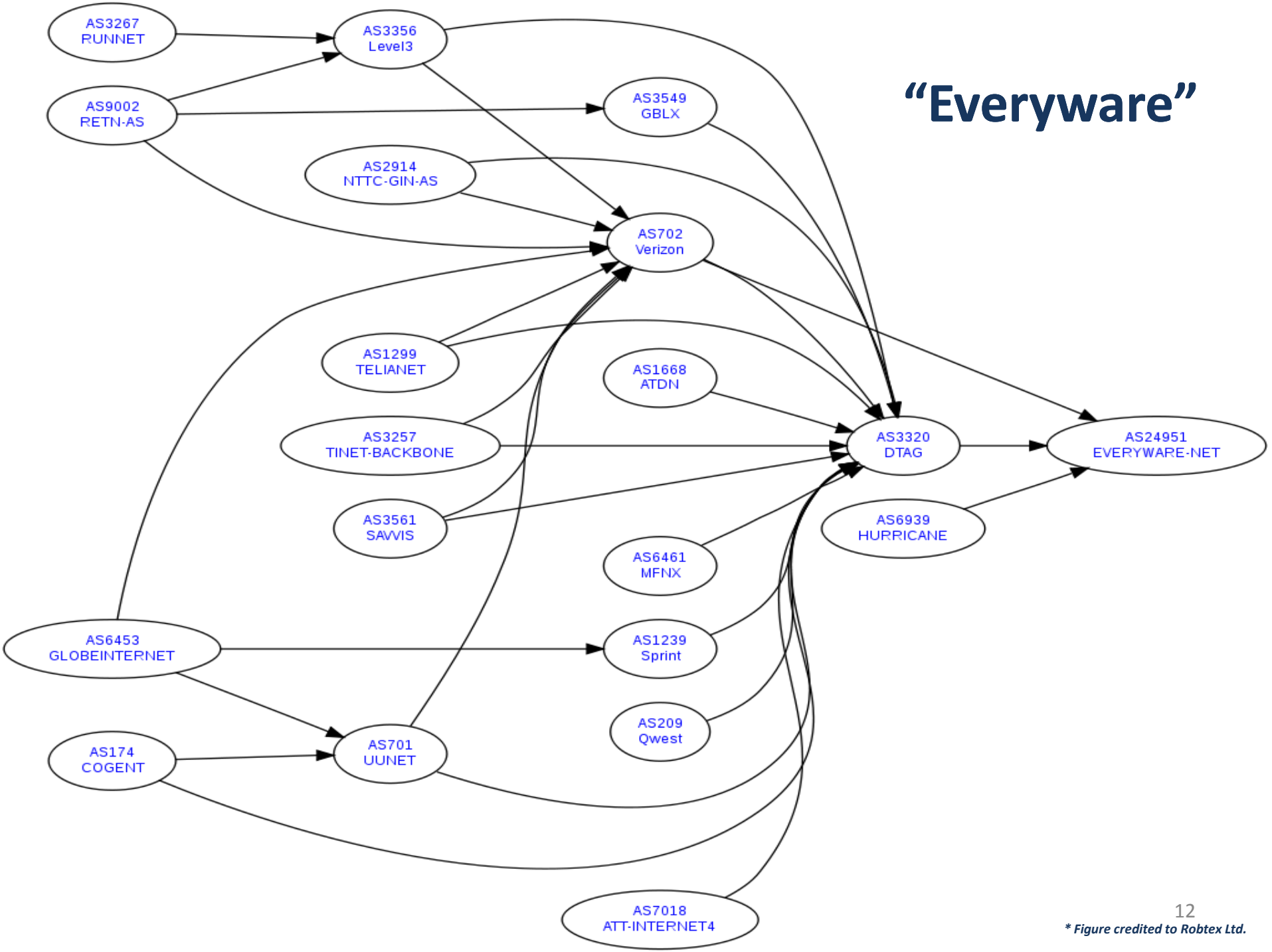
Natural user interfaces, or NUIs, is the term used by designers and developers of computer interfaces to refer to a user interface that is effectively invisible, or becomes invisible with successive learned interactions, to its users.


CONTEXT-AWARE APPLICATIONS
Applications based on the idea that computers can sense and react based on their environment. Devices may have information about the circumstances under which they are able to operate and based on rules, or an intelligent stimulus, react accordingly.



Data input without typing. Data is captured Automatically -usually through the use of equipment such as barcode readers or magnetic stripreaders, or technologies such as optical character recognition (OCR), radio frequency identification (RFID), or speech recognition.

“Everyware”



** Figure credited to Robtex Ltd.*

CLOUD COMPUTING

DIE

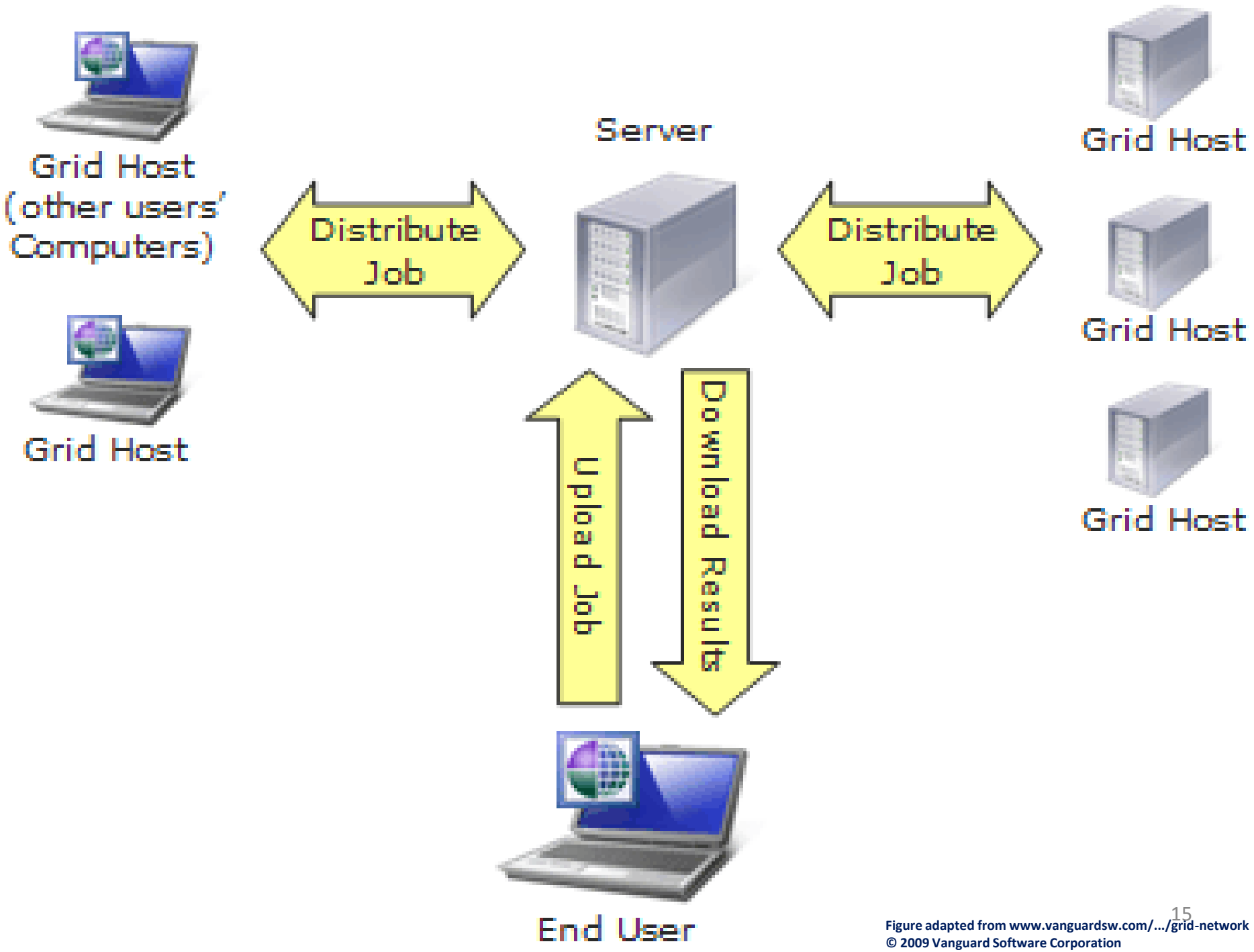


Figure adapted from www.vanguardsw.com/.../grid-network

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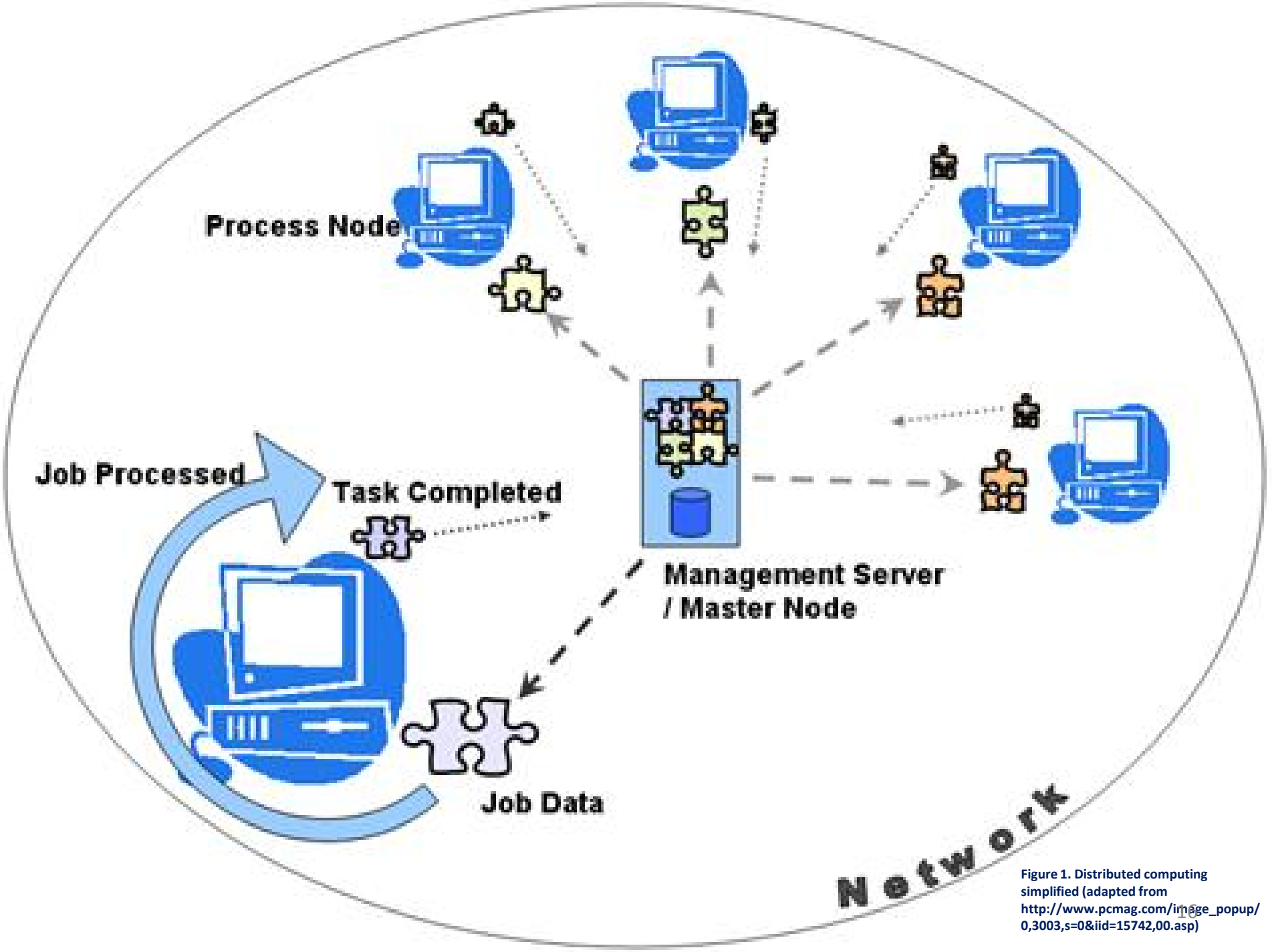


Figure 1. Distributed computing simplified (adapted from http://www.pcmag.com/image_popup/0,3003,s=0&iid=15742,00.asp)

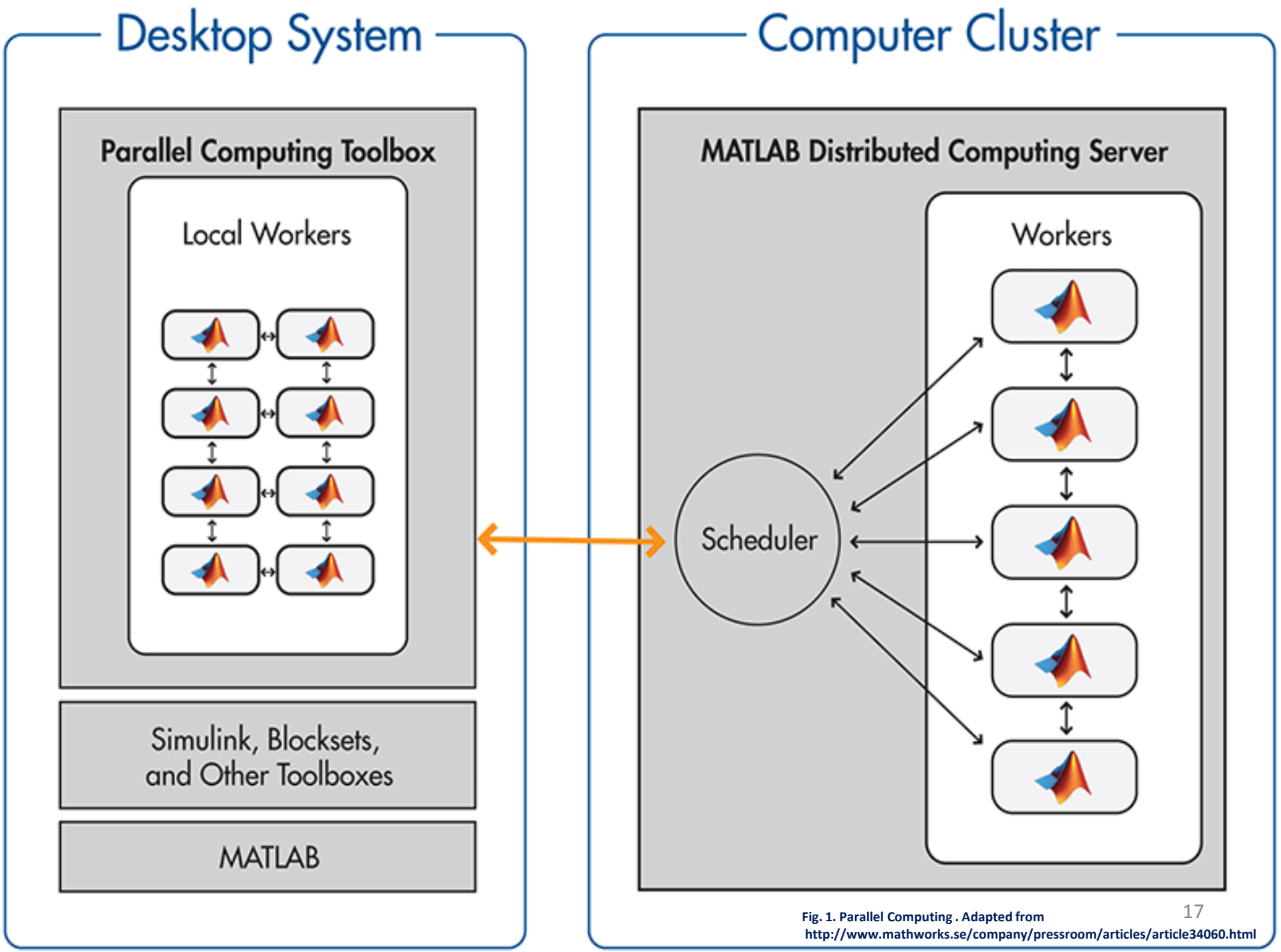
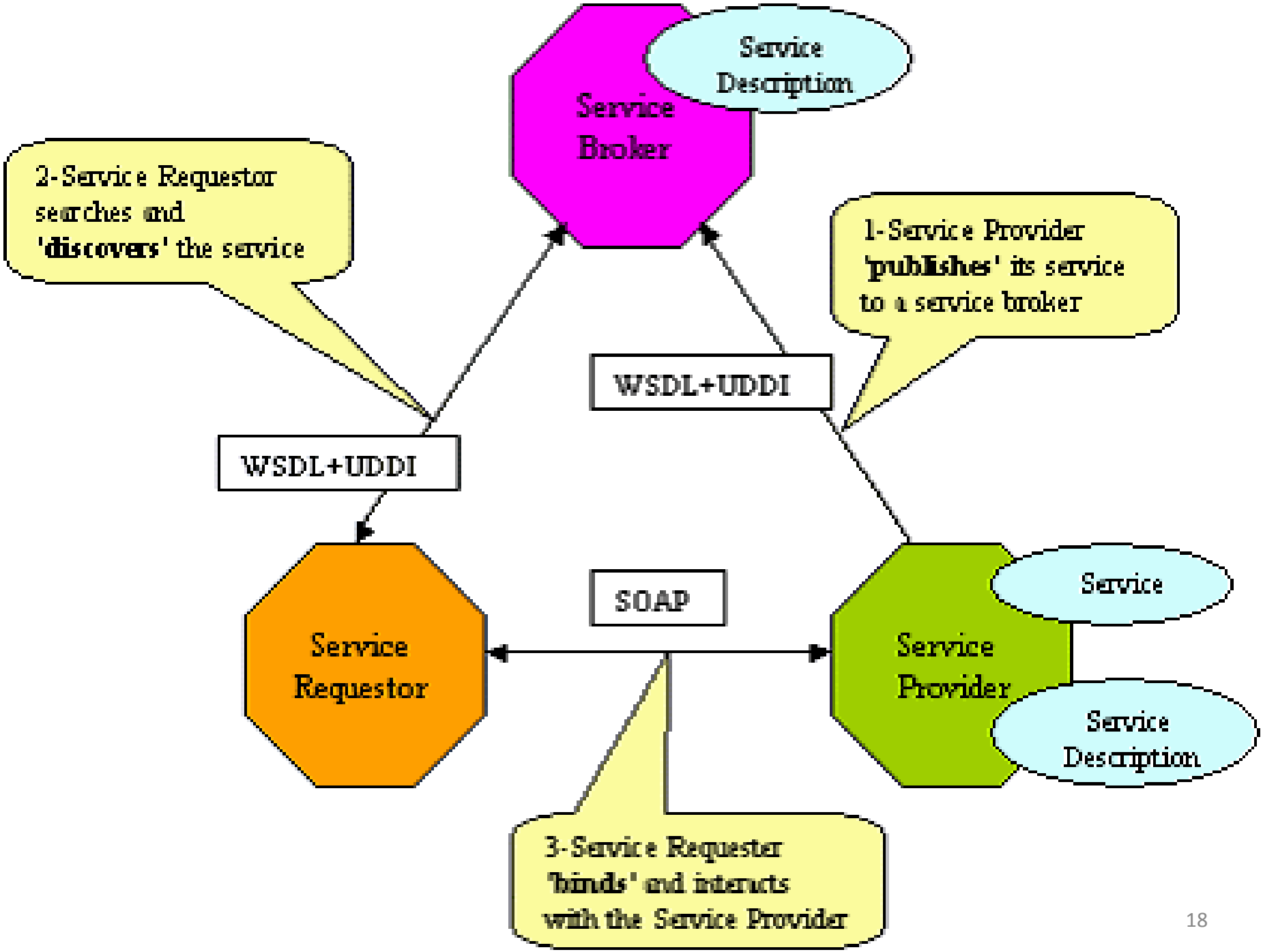
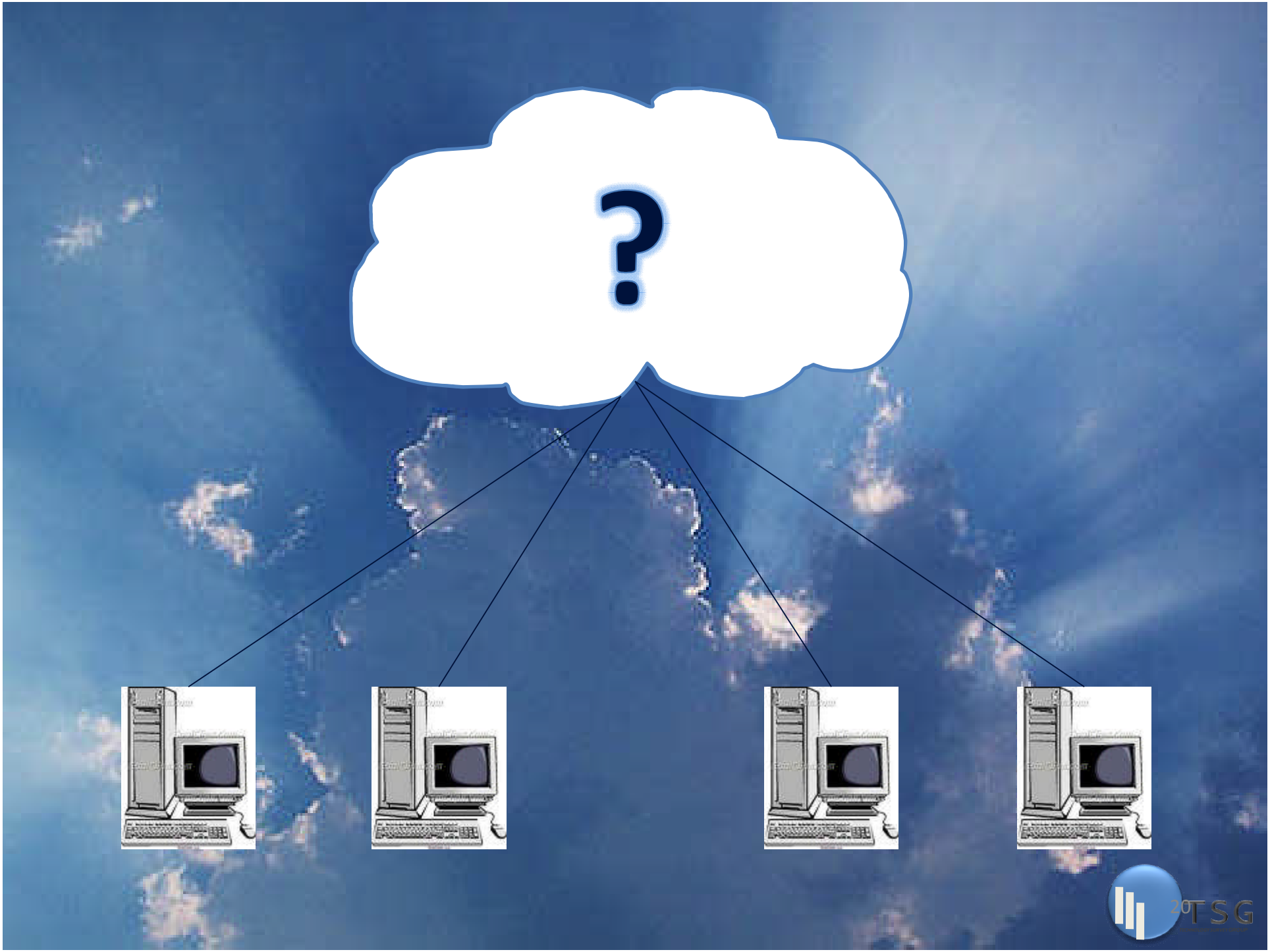


Fig. 1. Parallel Computing . Adapted from
http://www.mathworks.se/company/pressroom/articles/article34060.html


Service Broker
Service Description
2-Service Requestor searches and 'discovers' the service
1-Service Provider 'publishes' its service to a service broker
WSDL+UDDI
WSDL+UDDI
SOAP
Service Requestor
Service Provider
Service
Service Description
3-Service Requester 'binds' and interacts with the Service Provider

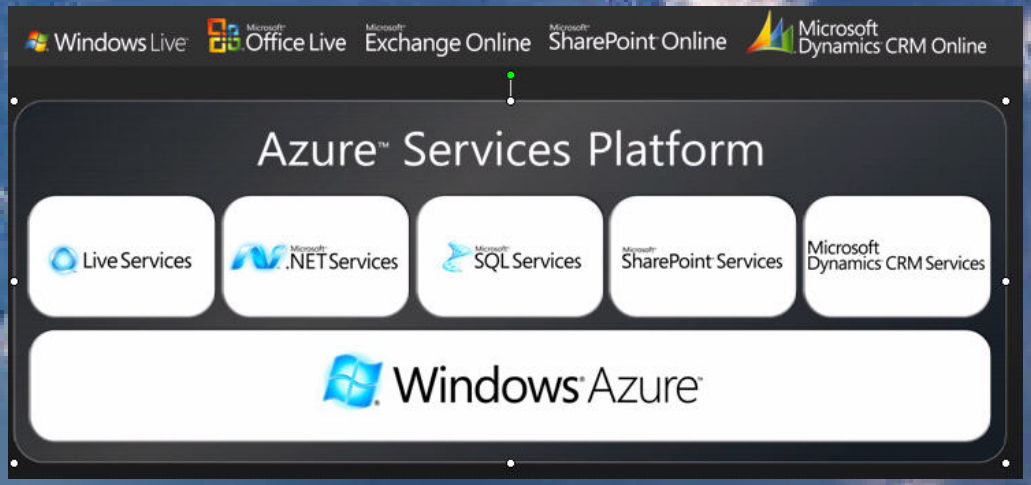
Cloud Computing

The provision of dynamically scalable and often virtualized resources as a service over the Internet on a utility basis.



amazon
web services™

Google
Apps
talk


Windows Live
Office Live
Exchange Online
SharePoint Online
Microsoft Dynamics CRM Online
Azure™ Services Platform
Live Services
.NET Services
SQL Services
SharePoint Services
Microsoft Dynamics CRM Services
Windows Azure

"DYNAMICALLY SCALABLE"
"VIRTUALIZED RESOURCES"
"SERVICES"
"INTERNET"
"SEAMLESS INTEGRATION"
"NEW PARADIGM"
"NOVEL"
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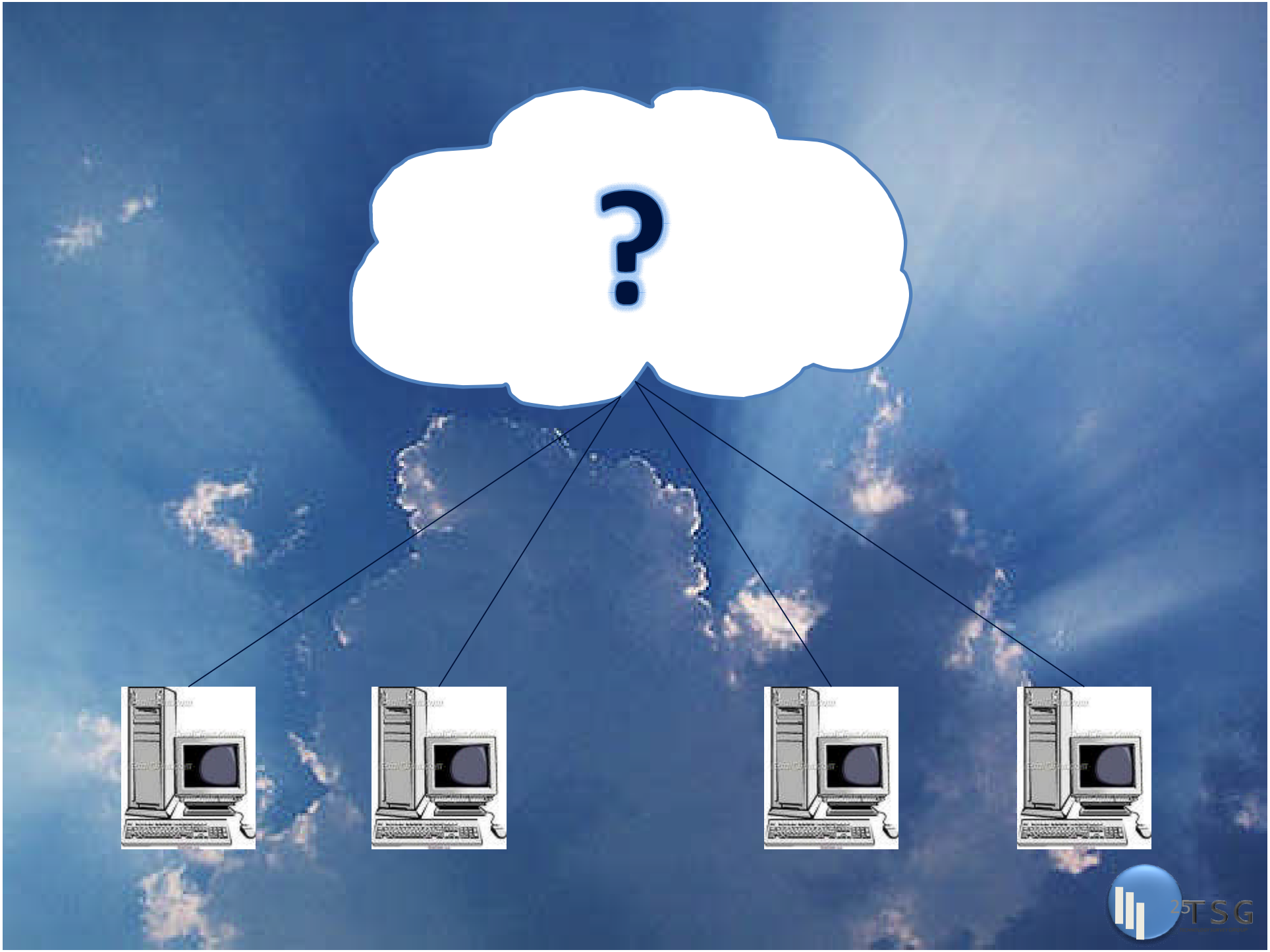

Infrastructure-as-a-Service
(IaaS)
Platform-as-a-Service
(PaaS)
Software-as-a-Service
(SaaS)

SaaS applications *may* use the cloud –
but they are *not* the cloud.
SOA architectures *may or may not*
be delivered via SaaS but…
they are *not* generically SaaS.
Cloud applications *may or may not*
be delivered as SaaS
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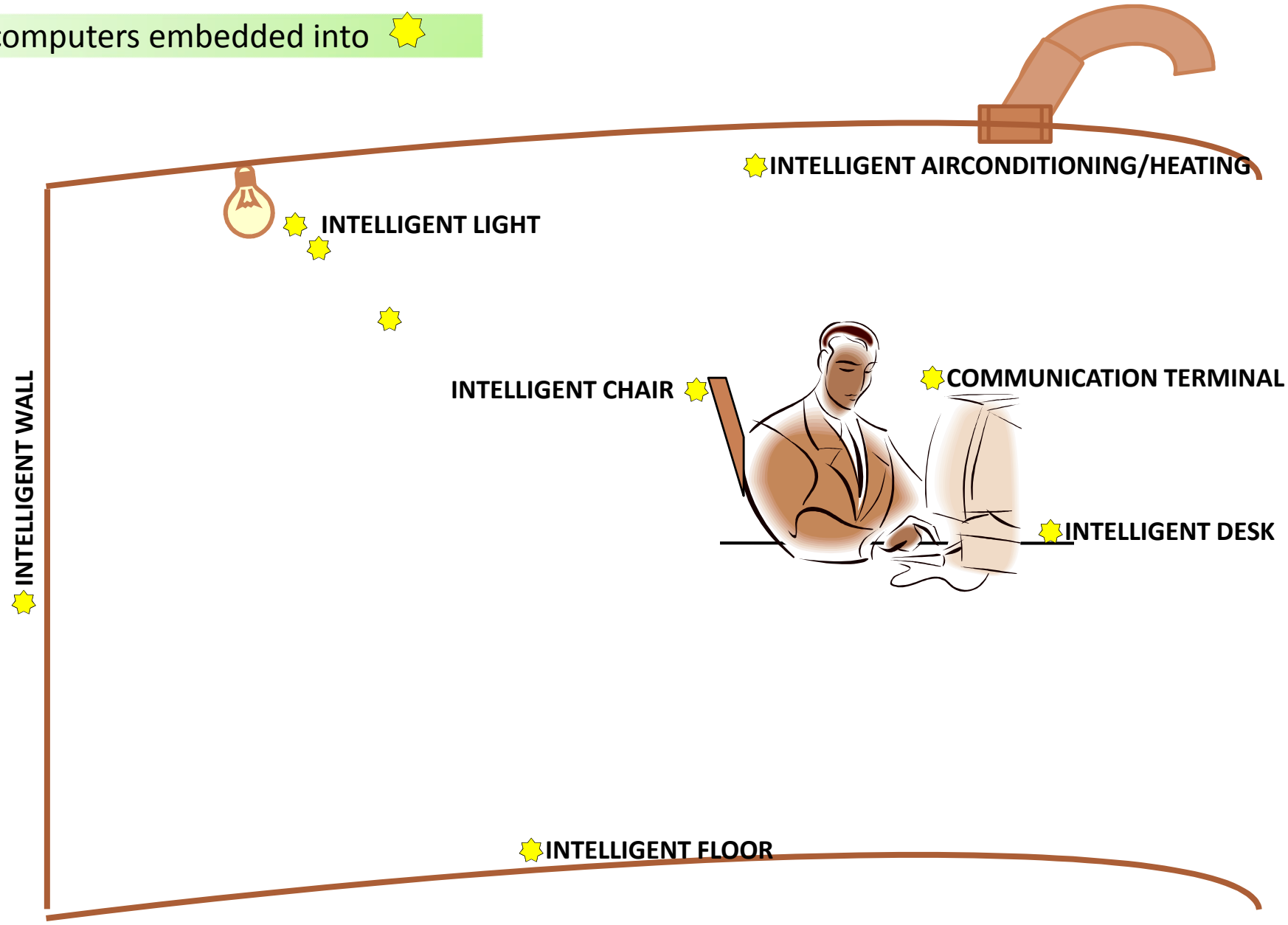
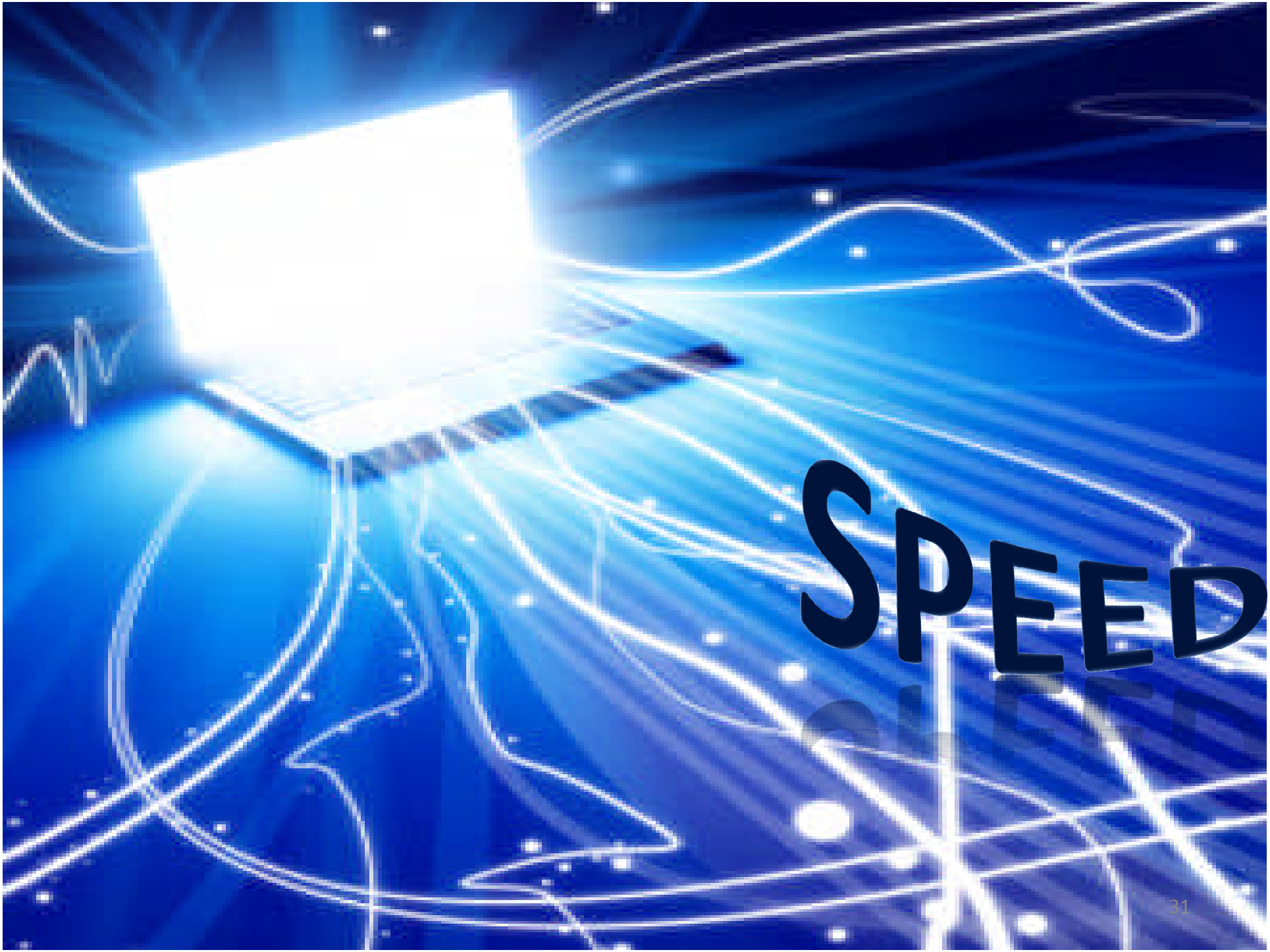
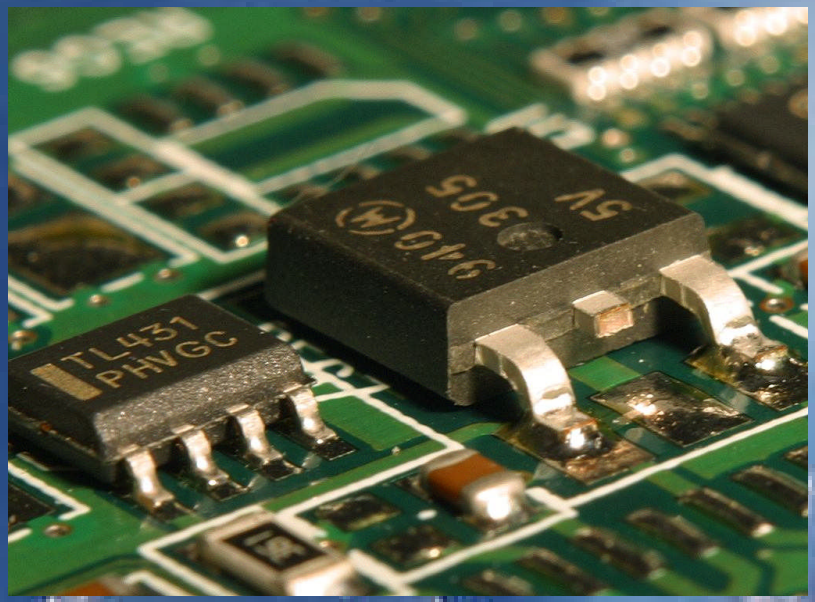
Tiny computers embedded into

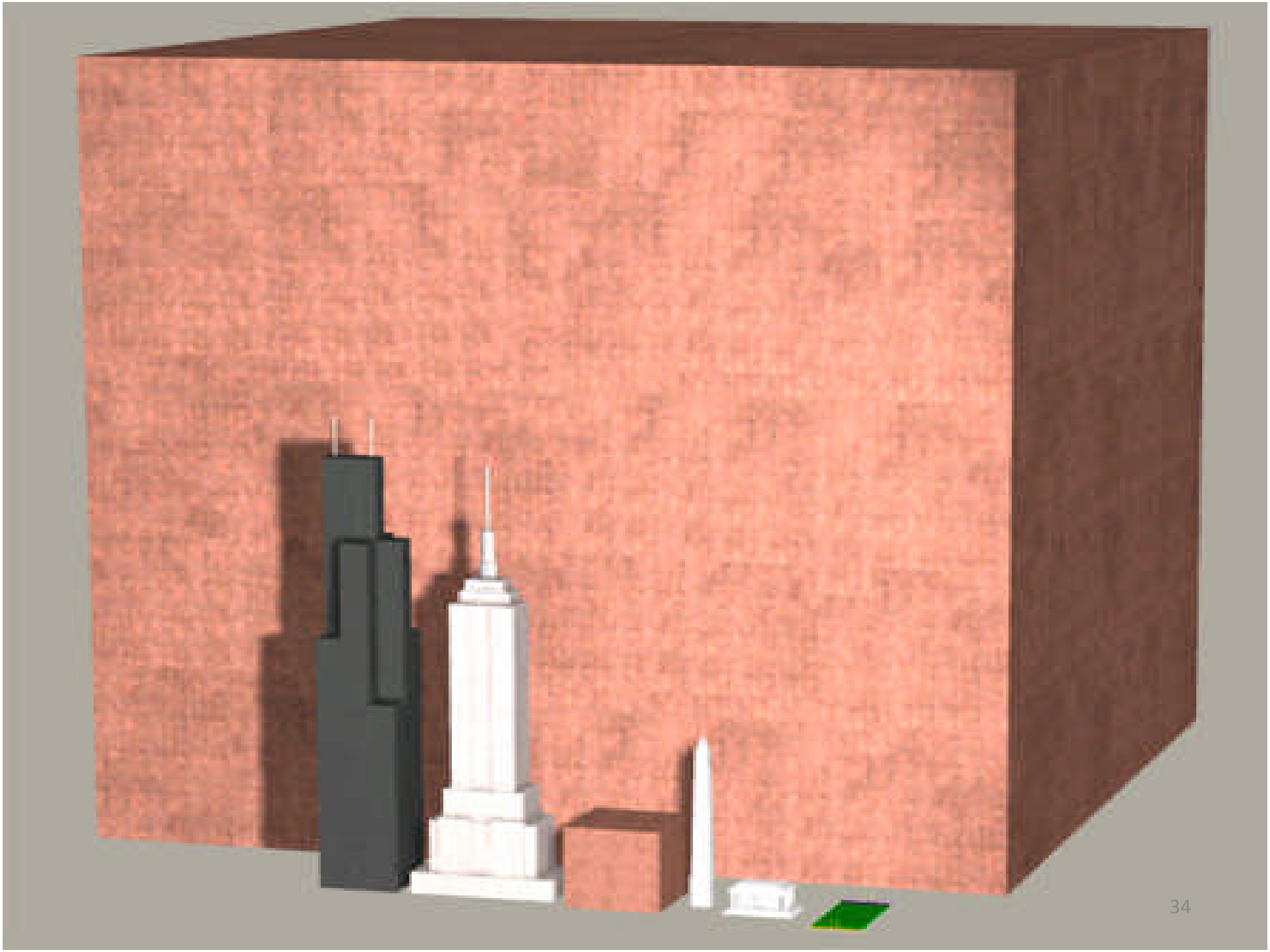


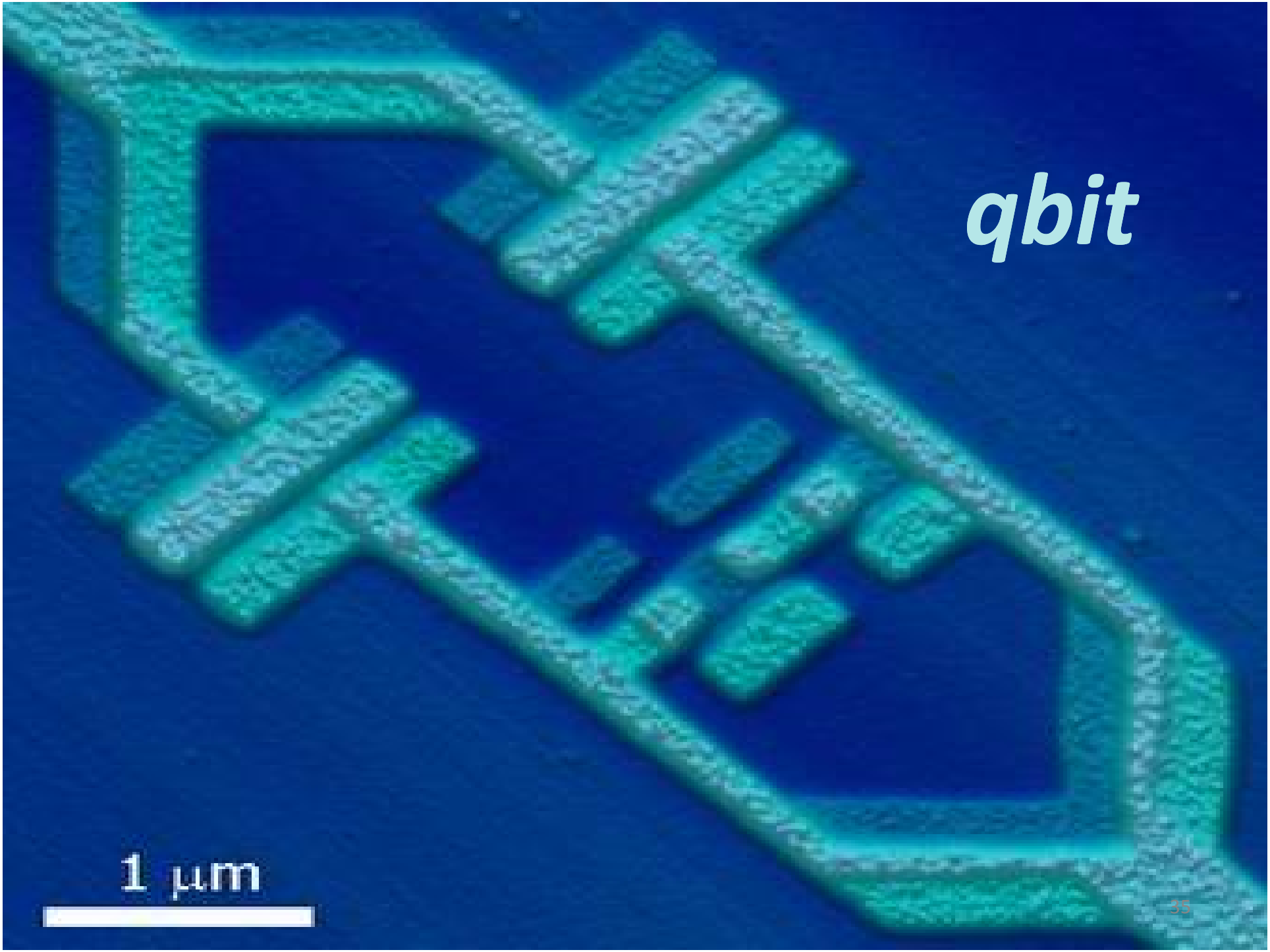

SPEED

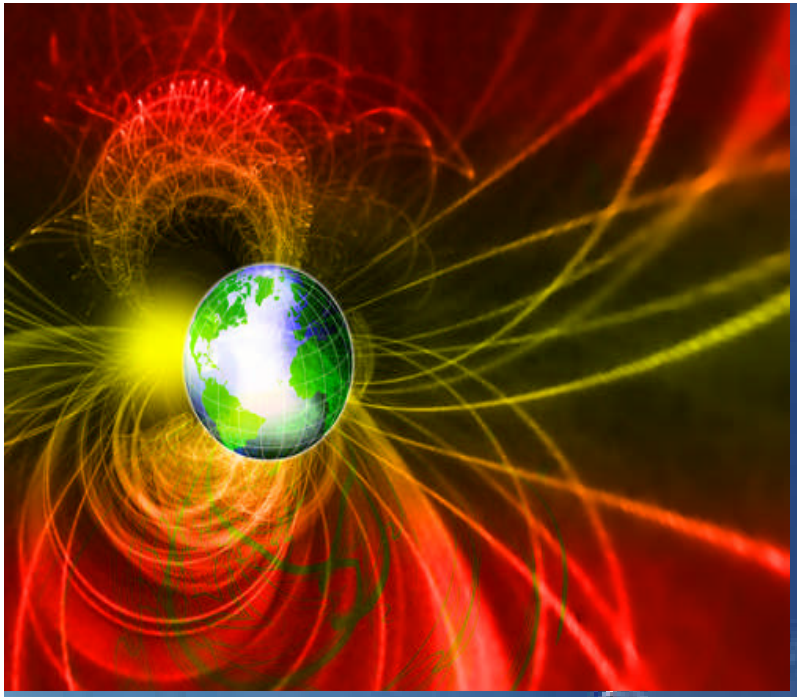
“AND”
“XOR”



For every unit of energy, a perfect quantum computer spits out ten quadrillion *more* operations each second than today's fastest processors




qbit
1 μm

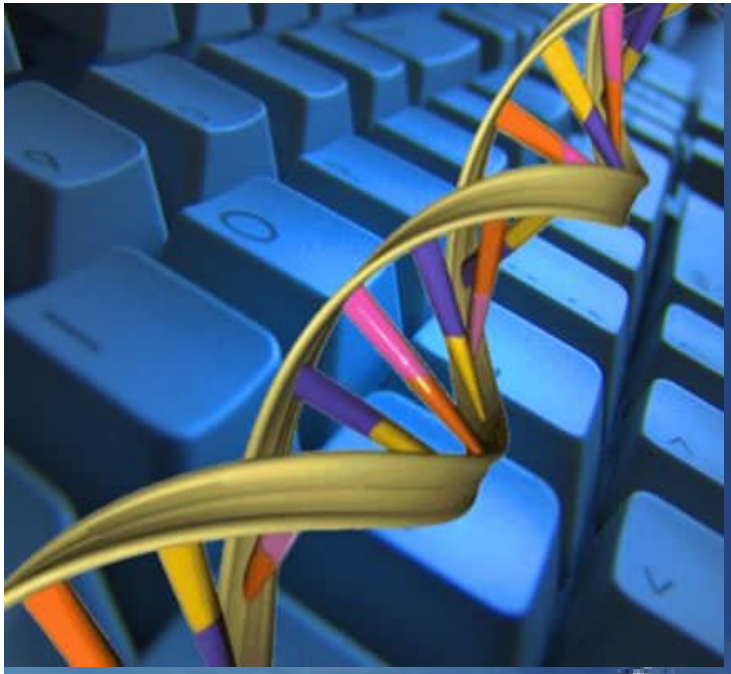


Quantum Computing

…harnesses the power of atoms and molecules to perform memory and processing tasks

…can represent *both* a 1 *and* a 0 at the same time

…will out-perform today's computer in next 5- 10 years



Molecular or "DNA" Computing

…focuses on the computational power of molecules

… can act as logic gates analogous to silicon -based gates of ordinary computers

SECURITY

Server Spotting
Confidentiality Attacks
Authentication Attacks
Integrity Attacks
DNS Poisoning
Availability Attacks
IP Spoofing
Sniffing
Denial of Service Attacks
Trojan Horse Attacks
Viruses
Rogue Access Points
Worms
Logic Bombs
Man in the Middle Attack

If Data Gets Violated in the Cloud,
Who is Responsible?
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Amazon Web Services
Customer Agreement

7.2. Security. We strive to keep Your Content secure, **but cannot guarantee that we will be successful at doing so**, given the nature of the Internet. Accordingly, without limitation to Section 4.3 above and Section 11.5 below, **you acknowledge that you bear sole responsibility for adequate security, protection and backup of Your Content and Applications**.

SO WHERE DOES THIS LEAVE US?