

	Grid computing	Cloud computing
What?	Grids enable access to shared computing power and storage capacity from your desktop	Clouds enable access to leased computing power and storage capacity from your desktop
Who provides the service?	Research institutes and universities federate their services around the world through projects such as EGI-InSPIRE and the European Grid Infrastructure.	Large individual companies e.g. Amazon and Microsoft and at a smaller scale, institutes and organizations deploying open source software such as Open Slate, Eucalyptus and Open Nebula.
Who uses the service?	Research collaborations, called "Virtual Organizations", which bring together researchers around the world working in the same field.	Small to medium commercial businesses or researchers with generic IT needs
Who pays for the service?	Governments - providers and users are usually publicly funded research organizations, for example through National Grid Initiatives.	The cloud provider pays for the computing resources; the user pays to use them
Where are the computing resources?	In computing centers distributed across different sites, countries and continents.	The cloud provider's private data centers which are often centralized in a few locations with excellent network connections and cheap electrical power.
Why use them?	<ul style="list-style-type: none"> - You don't need to buy or maintain your own large computer center - You can complete more work more quickly and tackle more difficult problems. - You can share data with your distributed team in a secure way. 	<ul style="list-style-type: none"> - You don't need to buy or maintain your own personal computer center - You can quickly access extra resources during peak work periods

What are they useful for?	Grids were designed to handle large sets of limited duration jobs that produce or use large quantities of data (e.g. the LHC and life sciences)	Clouds best support long term services and longer running jobs (E.g. facebook.com)
How do they work?	Grids are an open source technology. Resource users and providers alike can understand and contribute to the management of their grid	Clouds are a proprietary technology. Only the resource provider knows exactly how their cloud manages data, job queues and security requirements and so on.
Benefits?	<ul style="list-style-type: none"> - Collaboration: grid offers a federated platform for distributed and collective work. - Ownership : resource providers maintain ownership of the resources they contribute to the grid - Transparency: the technologies used are open source, encouraging trust and transparency. - Resilience: grids are located at multiple sites, reducing the risk in case of a failure at one site that removes significant resources from the infrastructure. 	<ul style="list-style-type: none"> - Flexibility: users can quickly outsource peaks of activity without long term commitment - Reliability: provider has financial incentive to guarantee service availability (Amazon, for example, can provide user rebates if availability drops below 99.9%) - Ease of use: relatively quick and easy for non-expert users to get started but setting up sophisticated virtual machines to support complex applications is more difficult.
Drawbacks?	<ul style="list-style-type: none"> - Reliability: grids rely on distributed services maintained by distributed staff, often resulting in inconsistency in reliability across individual sites, although the service itself is always available. 	<ul style="list-style-type: none"> - Generality: clouds do not offer many of the specific high-level services currently provided by grid technology. - Security: users with sensitive data may be reluctant to entrust it to

	<ul style="list-style-type: none"> - Complexity: grids are complicated to build and use, and currently users require some level of expertise. - Commercial: grids are generally only available for not-for-profit work, and for proof of concept in the commercial sphere 	<p>external providers or to providers outside their borders.</p> <ul style="list-style-type: none"> - Opacity: the technologies used to guarantee reliability and safety of cloud operations are not made public. - Rigidity: the cloud is generally located at a single site, which increases risk of complete cloud failure. - Provider lock-in: there's a risk of being locked in to services provided by a very small group of suppliers.
When?	<p>The concept of grids was proposed in 1995. The Open science grid (OSG) started in 1995</p> <p>The EDG (European Data Grid) project began in 2001.</p>	<p>In the late 1990's Oracle and EMC offered early private cloud solutions. However the term cloud computing didn't gain prominence until 2007.</p>