Обща информация:

In basic terms, cloud computing is the phrase used to describe different scenarios in which computing resource is delivered as a service over a network connection (usually, this is the internet). Cloud computing is therefore a type of computing that relies on sharing a pool of physical and/or virtual resources, rather than deploying local or personal hardware and software. It is somewhat synonymous with the term ‘utility computing’ as users are able to tap into a supply of computing resource rather than manage the equipment needed to generate it themselves; much in the same way as a consumer tapping into the national electricity supply, instead of running their own generator.

One of the key characteristics of cloud computing is the flexibility that it offers and one of the ways that flexibility is offered is through scalability. This refers to the ability of a system to adapt and scale to changes in workload. Cloud technology allows for the automatic provision and deprovision of resource as and when it is necessary, thus ensuring that the level of resource available is as closely matched to current demand as possible. This is a defining characteristic that differentiates it from other computing models where resource is delivered in blocks (e.g., individual servers, downloaded software applications), usually with fixed capacities and upfront costs.

However, the advantages of cloud computing are not limited to flexibility. Enterprise can also benefit (in varying degrees) from the economies of scale created by setting up services en masse with the same computing environments, and the reliability of physically hosting services across multiple servers where individual system failures do not affect the continuity of the service.

Геша

## Characteristics

Cloud computing exhibits the following key characteristics:

* **Agility** improves with users' ability to re-provision technological infrastructure resources.
* **Cost** reductions claimed by cloud providers. A public-cloud delivery model converts capital expenditure to [operational expenditure](https://en.wikipedia.org/wiki/Operational_expenditure).[[42]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-42) This purportedly lowers [barriers to entry](https://en.wikipedia.org/wiki/Barriers_to_entry), as infrastructure is typically provided by a third party and need not be purchased for one-time or infrequent intensive computing tasks. Pricing on a utility computing basis is fine-grained, with usage-based options and fewer IT skills are required for implementation (in-house).[[43]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-idc-43) The e-FISCAL project's state-of-the-art repository[[44]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-44)contains several articles looking into cost aspects in more detail, most of them concluding that costs savings depend on the type of activities supported and the type of infrastructure available in-house.
* [**Device and location independence**](https://en.wikipedia.org/wiki/Device_independence)[[45]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-yarmis-45) enable users to access systems using a web browser regardless of their location or what device they use (e.g., PC, mobile phone). As infrastructure is off-site (typically provided by a third-party) and accessed via the Internet, users can connect from anywhere.[[43]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-idc-43)
* [**Maintenance**](https://en.wikipedia.org/wiki/Software_maintenance) of cloud computing applications is easier, because they do not need to be installed on each user's computer and can be accessed from different places.
* [**Multitenancy**](https://en.wikipedia.org/wiki/Multitenancy) enables sharing of resources and costs across a large pool of users thus allowing for:
  + **centralization** of infrastructure in locations with lower costs (such as real estate, electricity, etc.)
  + **peak-load capacity** increases (users need not engineer for highest possible load-levels)
  + **utilisation and efficiency** improvements for systems that are often only 10–20% utilised.[[46]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-amazon-46)[[47]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-47)
* [**Performance**](https://en.wikipedia.org/wiki/Computer_performance) is monitored, and consistent and loosely coupled architectures are constructed using [web services](https://en.wikipedia.org/wiki/Web_services) as the system interface.[[43]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-idc-43)[[48]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-48)[[49]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-Elsevier.com-49)
* [**Productivity**](https://en.wikipedia.org/wiki/Productivity) may be increased when multiple users can work on the same data simultaneously, rather than waiting for it to be saved and emailed. Time may be saved as information does not need to be re-entered when fields are matched, nor do users need to install application software upgrades to their computer.[[50]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-Smith2013-50)
* **Reliability** improves with the use of multiple redundant sites, which makes well-designed cloud computing suitable for [business continuity](https://en.wikipedia.org/wiki/Business_continuity) and [disaster recovery](https://en.wikipedia.org/wiki/Disaster_recovery).[[51]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-51)
* **Scalability and**[**elasticity**](https://en.wikipedia.org/wiki/Elasticity_(cloud_computing)) via dynamic ("on-demand") [provisioning](https://en.wikipedia.org/wiki/Provisioning) of resources on a fine-grained, self-service basis in near real-time[[52]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-vmstartuptime2012-52)[[53]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-53) (Note, the VM startup time varies by VM type, location, OS and cloud providers[[52]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-vmstartuptime2012-52)), without users having to engineer for peak loads.[[54]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-54)[[55]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-55)[[56]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-He_15.E2.80.9322-56) This gives the ability to scale up when the usage need increases or down if resources are not being used.[[57]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-57)

Модели на доставка

Cloud е изграден на принципа всичко е “service”. Чрез този принцип архитектурата на Cloud може да се разгледа базирана на 3 основни “services”. Всички services в Cloud комуникират помежду си, чрез специален протокол за комуникация по мрежата. Това предоставя удобен и лесен начин за менажиране на отделните компоненти и дава възможност на отделните services да работят независимо един от друг(т.е. ако единия падне другите могат да продължат работата си). Въпреки това, че “services” работя независимо един от друг, те заедно комбинирани образуват “Cloud” структурата.

**ИААС - 7**

Virtual machines - <https://en.wikipedia.org/wiki/Virtual_machine>

https://bg.wikipedia.org/wiki/%D0%92%D0%B8%D1%80%D1%82%D1%83%D0%B0%D0%BB%D0%BD%D0%B0\_%D0%BC%D0%B0%D1%88%D0%B8%D0%BD%D0%B0

Servers - <https://en.wikipedia.org/wiki/Server_(computing)>

Storage - <https://en.wikipedia.org/wiki/Database>

Load Balancers - https://en.wikipedia.org/wiki/Load\_balancing\_(computing)

* Scalability; resource is available as and when the client needs it and, therefore, there are no delays in expanding capacity or the wastage of unused capacity
* No investment in hardware; the underlying physical hardware that supports an IaaS service is set up and maintained by the cloud provider, saving the time and cost of doing so on the client side
* Utility style costing; the service can be accessed on demand and the client only pays for the resource that they actually use
* Location independence; the service can usually be accessed from any location as long as there is an internet connection and the security protocol of the cloud allows it
* Physical security of data centre locations; services available through a public cloud, or private clouds hosted externally with the cloud provider, benefit from the physical security afforded to the servers which are hosted within a data centre
* No single point of failure; if one server or network switch, for example, were to fail, the broader service would be unaffected due to the remaining multitude of hardware resources and redundancy configurations.  For many services if one entire data center were to go offline, nevermind one server, the IaaS service could still run successfully.

**ПААС - 11**

* **They don’t have to invest in physical infrastructure;** being able to ‘rent’ virtual infrastructure has both cost benefits and practical benefits. They don’t need to purchase hardware themselves or employ the expertise to manage it. This leaves them free to focus on the development of applications. What’s more, clients will only need to rent the resources they need rather than invest in fixed, unused and therefore wasted capacity.
* **Makes development possible for ‘non-experts’;** with some PaaS offerings anyone can develop an application. They can simply do this through their web browser utilising one-click functionality. Salient examples of this are one-click blog software installs such as WordPress.
* **Flexibility;** customers can have control over the tools that are installed within their platforms and can create a platform that suits their specific requirements. They can ‘pick and choose’ the features they feel are necessary.
* **Adaptability;** Features can be changed if circumstances dictate that they should.
* **Teams in various locations can work together;** as an internet connection and web browser are all that is required, developers spread across several locations can work together on the same application build.
* **Security;** security is provided, including data security and backup and recovery.

**Private Cloud – 14**

A [private cloud](http://www.interoute.com/vdc) is a particular model of cloud computing that involves a distinct and secure cloud based environment in which only the specified client can operate. As with other cloud models, private clouds will provide computing power as a service within a virtualised environment using an underlying pool of physical computing resource. However, under the private cloud model, the cloud (the pool of resource) is only accessible by a single organisation providing that organisation with greater control and privacy.

The technical mechanisms used to provide the different services which can be classed as being private cloud services can vary considerably and so it is hard to define what constitutes a private cloud from a technical aspect. Instead such services are usually categorised by the features that they offer to their client. Traits that characterise private clouds include the ring fencing of a cloud for the sole use of one organisation and higher levels of network security. They can be defined in contrast to a public cloud which has multiple clients accessing virtualised services which all draw their resource from the same pool of servers across public networks. Private cloud services draw their resource from a dsitinct pool of physical computers but these may be hosted internally or externally and may be accessed across private leased lines or secure encrypted connections via public networks.

The additional security offered by the ring fenced cloud model is ideal for any organisation, including enterprise, that needs to store and process private data or carry out sensitive tasks. For example, a private cloud service could be utilised by a financial company that is required by regulation to store sensitive data internally and who will still want to benefit from some of the advantages of cloud computing within their business infrastructure, such as on demand resource allocation.

Предимства - 15

* **Higher security and privacy**; public clouds services can implement a certain level of security but private clouds - using techniques such as distinct pools of resources with access restricted to connections made from behind one organisation’s firewall, dedicated leased lines and/or on-site internal hosting - can ensure that operations are kept out of the reach of prying eyes
* **More control**; as a private cloud is only accessible by a single organisation, that organisation will have the ability to configure and manage it inline with their needs to achieve a tailored network solution. However, this level of control removes somes the economies of scale generated in public clouds by having centralised management of the hardware
* **Cost and energy efficiency**; implementing a private cloud model can improve the allocation of resources within an organisation by ensuring that the availability of resources to individual departments/business functions can directly and flexibly respond to their demand. Therefore, although they are not as cost effective as a public cloud services due to smaller economies of scale and increased management costs, they do make more efficient use of the computing resource than traditional LANs as they minimise the investment into unused capacity. Not only does this provide a cost saving but it can reduce an organisation’s carbon footprint too
* **Improved reliability**; even where resources (servers, networks etc.) are hosted internally, the creation of virtualised operating environments means that the network is more resilient to individual failures across the physical infrastructure. Virtual partitions can, for example, pull their resource from the remaining unaffected servers. In addition, where the cloud is hosted with a third party, the organisation can still benefit from the physical security afforded to infrastructure hosted within data centres
* **Cloud bursting**; some providers may offer the opportunity to employ cloud bursting, within a private cloud offering, in the event of spikes in demand. This service allows the provider to switch certain non-sensitive functions to a public cloud to free up more space in the private cloud for the sensitive functions that require it. Private clouds can even be integrated with public cloud services to form hybrid clouds where non-sensitive functions are always allocated to the public cloud to maximise the efficiencies on offer.

More information on [Interoute's Cloud Services](http://www.interoute.com/unified-ict/computing/cloud-services)

Публичен cloud – 16

The most recognisable model of cloud computing to many consumers is the [public cloud](http://www.interoute.com/vdc) model, under which cloud services are provided in a virtualised environment, constructed using pooled shared physical resources, and accessible over a public network such as the internet. To some extent they can be defined in contrast to private clouds which ring-fence the pool of underlying computing resources, creating a distinct cloud platform to which only a single organisation has access. Public clouds, however, provide services to multiple clients using the same shared infrastructure.

 A cloud is called a "public cloud" when the services are rendered over a network that is open for public use. Public cloud services may be free.[[83]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-83) Technically there may be little or no difference between public and private cloud architecture, however, security consideration may be substantially different for services (applications, storage, and other resources) that are made available by a service providr for a public audience and when communication is effected over a non-trusted network. Generally, public cloud service providers like [Amazon Web Services](https://en.wikipedia.org/wiki/Amazon_Web_Services) (AWS), Microsoft and Google own and operate the infrastructure at their [data center](https://en.wikipedia.org/wiki/Data_center) and access is generally via the Internet. AWS and Microsoft also offer direct connect services called "AWS Direct Connect" and "Azure ExpressRoute" respectively, such connections require customers to purchase or lease a private connection to a peering point offered by the cloud provider.[[43]](https://en.wikipedia.org/wiki/Cloud_computing#cite_note-idc-43)

The most salient examples of cloud computing tend to fall into the public cloud model because they are, by definition, publicly available. Software as a Service (SaaS) offerings such as cloud storage and online office applications are perhaps the most familiar, but widely available Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) offerings, including cloud based web hosting and development environments, can follow the model as well (although all can also exist within private clouds). Public clouds are used extensively in offerings for private individuals who are less likely to need the level of infrastructure and security offered by private clouds. However, enterprise can still utilise public clouds to make their operations significantly more efficient, for example, with the storage of non-sensitive content, online document collaboration and webmail.

Предимства – 17

* Ultimate scalability; cloud resources are available on demand from the public clouds’ vast pools of resource so that the applications that run on them can respond seamlessly to fluctuations in activity
* Cost effective; public clouds bring together greater levels of resource and so can benefit from the largest economies of scale. The centralised operation and management of the underlying resources is shared across all of the subsequent cloud services whilst components, such as servers, require less bespoke configuration. Some mass market propositions can even be free to the client, relying on advertising for their revenue.
* Utility style costing; public cloud services often employ a pay-as-you-go charging model whereby the consumer will be able to access the resource they need, when they need it, and then only pay for what they use; therefore avoiding wasted capacity
* Reliability; the sheer number of servers and networks involved in creating a public cloud and the redundancy configurations mean that should one physical component fail, the cloud service would still run unaffected on the remaining components. In some cases, where clouds draw resource from multiple data centres, an entire data centre could go offline and individual cloud services would suffer no ill effect. There is, in other words, no single point of failure which would make a public cloud service vulnerable
* Flexibility; there are a myriad of IaaS, PaaS and SaaS services available on the market which follow the public cloud model and that are ready to be accessed as a service from any internet enabled device. These services can fulfil most computing requirements and can deliver their benefits to private and enterprise clients alike. Businesses can even integrate their public cloud services with private clouds, where they need to perform sensitive business functions, to create hybrid clouds
* Location independence; the availability of public cloud services through an internet connection ensures that the services are available wherever the client is located. This provides invaluable opportunities to enterprise such as remote access to IT infrastructure (in case of emergencies etc) or online document collaboration from multiple locations.

Hybrid cloud – 20

# **What is a Hybrid Cloud?**

A [hybrid cloud](http://www.interoute.com/vdc) is an integrated cloud service utilising both private and public clouds to perform distinct functions within the same organisation. All cloud computing services should offer certain efficiencies to differing degrees but public cloud services are likely to be more cost efficient and scalable than private clouds. Therefore, an organisation can maximise their efficiencies by employing public cloud services for all non-sensitive operations, only relying on a private cloud where they require it and ensuring that all of their platforms are seamlessly integrated.

Hybrid cloud models can be implemented in a number of ways:

* Separate cloud providers team up to provide both private and public services as an integrated service
* Individual cloud providers offer a complete hybrid package
* Organisations who manage their private clouds themselves sign up to a public cloud service which they then integrate into their infrastructure

In practice, an enterprise could implement hybrid cloud hosting to host their e-commerce website within a private cloud, where it is secure and scalable, but their brochure site in a public cloud, where it is more cost effective (and security is less of a concern). Alternatively, an Infrastructure as a Service (IaaS) offering, for example, could follow the hybrid cloud model and provide a financial business with storage for client data within a private cloud, but then allow collaboration on project planning documents in the public cloud - where they can be accessed by multiple users from any convenient location.

Предимства – 21

* Scalability; whilst private clouds do offer a certain level of scalability depending on their configurations (whether they are hosted internally or externally for example), public cloud services will offer scalability with fewer boundaries because resource is pulled from the larger cloud infrastructure. By moving as many non-sensitive functions as possible to the public cloud it allows an organisation to benefit from public cloud scalability whilst reducing the demands on a private cloud.
* Cost efficiencies; again public clouds are likely to offer more significant economies of scale (such as centralised management), and so greater cost efficiencies, than private clouds. Hybrid clouds therefore allow organisations to access these savings for as many business functions as possible whilst still keeping sensitive operations secure.
* Security; the private cloud element of the hybrid cloud model not only provides the security where it is needed for sensitive operations but can also satisfy regulatory requirements for data handling and storage where it is applicable
* Flexibility; the availability of both secure resource and scalable cost effective public resource can provide organisations with more opportunities to explore different operational avenues

Community cloud – 22

A community cloud is a multi-tenant platform which allows several companies work on the same platform, given that they have similar needs and concerns.

* One example of using a *community cloud* would be to test-drive some high-end security products or even test out some features of a public cloud environment. This is great for organizations that are driven by compliance and regulatory measures. Government, healthcare, and some regulated private industries are leveraging the added security features within a community cloud environment. Instead of just provisioning space in a public cloud, organizations can test and work on a cloud platform which is secure, “dedicated,” and even compliant with certain regulations. The really interesting part is that with a community cloud, the presence can be either onsite or offsite.
* Or, as another example, several organizations may require a specific application that resides on one set of cloud servers. Instead of giving each organization their own server in the cloud for this app, the hosting company allows multiple customers connect into their environment and logically segment their sessions. The customer, however, is still using the same pieces of hardware as other folks are. However, everyone is hitting these servers with the same purpose — to access that one application — which is what makes it a community cloud.

The reality here is that as technology and cloud-based tools expand, there will be more uses for some type of cloud-hosted architecture. Several large cloud providers have already created some type of community cloud offering. There are small and big benefits to working with a certain type of cloud model. The bottom line is that the diversity in cloud computing offerings allows organizations and engineers to find pieces of the cloud that can help enable their business and practice.

A **community cloud** in [computing](https://en.wikipedia.org/wiki/Computing) is a collaborative effort in which infrastructure is shared between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.), whether managed internally or by a third-party and hosted internally or externally.This is controlled and used by a group of organizations that have shared interest. The costs are spread over fewer users than a public cloud (but more than a private cloud), so only some of the cost savings potential of cloud computing are realized.[[1]](https://en.wikipedia.org/wiki/Community_cloud#cite_note-nist-1)