

Cloud computing - statistics on the use by enterprises

Statistics Explained

Data extracted in December 2021.

Planned article update: December 2023.

" 41 % of EU enterprises used cloud computing in 2021, mostly for e-mail and storage of files."

" Compared with 2020, the use of cloud computing in the EU increased particularly in the retail trade in 2021. "

Cloud computing for business yet to go mainstream in the EU This article presents recent statistics on enterprises' use of cloud computing services in the European Union (EU) . In principle, cloud computing involves two components, a cloud infrastructure and software applications. The first consists of the hardware resources required to support the cloud services being provided and typically includes server, storage and network components. The second component refers to software applications and computing power for running business applications, provided via the internet by third parties.

Use of cloud computing: highlights

- 41 % of EU enterprises used cloud computing in 2021, mostly for hosting their e-mail systems and storing files in electronic form.
- 73 % of those enterprises used sophisticated cloud services relating to security software applications, hosting enterprise's databases or computing platform for application development, testing or deployment.
- Compared with 2020, the use of cloud computing increased by 5 percentage points.

Cloud computing as a service model for meeting enterprises' ICT needs

Essentially, instead of building or expanding their own IT infrastructure (which would include hardware and involve developing and maintaining software applications and databases), enterprises can access computing resources hosted by third parties on the internet (the 'cloud').

In technological terms, cloud computing is a model for providing enterprises with ubiquitous, flexible, on demand access over the internet to a pool of configurable computing resources, including servers, databases, software applications, storage capacity and computing power.

Cloud computing can be seen as the technological evolution of server-based computing. The cloud/internet functions as an enormous networked server. Consequently, enterprises can use the services through the internet using devices ranging from relatively low-cost desktop computers ('thin clients') to any number of various portable devices.

Cloud computing services should be delivered from service providers' servers and, for the purposes of the ICT usage and e-commerce in enterprises survey, have the following mandatory characteristics:

- *on-demand self-service* : users may request computing resources without human interaction with the service provider;

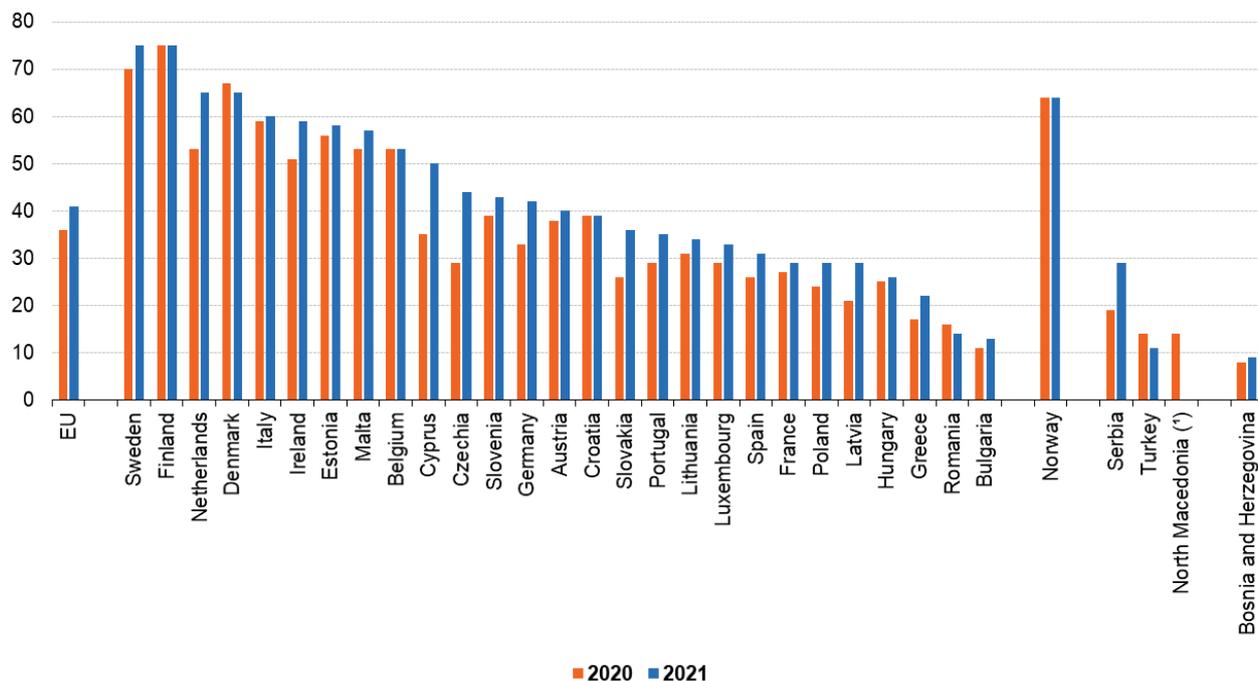
- *elasticity of provision* : capabilities may be easily scaled up or down, e.g. in response to changes in the number of users or required storage capacity, so that enterprises can meet demand peaks without having to invest in infrastructure that will otherwise remain idle or underutilised; and
- payable services* (pay-per-user, pay-per-use or pre-paid).

In principle, the service providers may deliver ICT-related services from shared servers (public cloud) or from a cloud infrastructure provided for the exclusive use of a particular enterprise (private cloud).

Enterprises using cloud computing

As cloud computing services can be delivered only via the internet, enterprises must have internet access to be able to use them. In 2021, this applied to almost all EU enterprises (98 %) with 10 or more employees and self-employed. Although the proportion of enterprises with internet access was at similar near saturation levels in most Member States, only more than two in five (41 %) reported that they used cloud computing services, with an increase of 5 percentage points (pp) compared to 2020 (see Figure 1).

Use of cloud computing services, 2020 and 2021
(% of enterprises)



(*) Data for 2021: not available yet.

Note: Montenegro 2020 and 2021: data unreliable. Iceland: data not available

Source: Eurostat (online data code: isoc_cicce_use)

eurostat

Figure 1: Use of cloud computing services in enterprises, 2020 and 2021 (% of enterprises) Source: Eurostat (isoc_cicce_use)

Significant differences can be observed across countries. In Sweden (75 %), Finland (75 %), the Netherlands (65 %) and Denmark (65 %) at least 65 % of enterprises used cloud computing. On the other hand, in Greece (22 %), Romania (14 %) and Bulgaria (13 %) less than 25 % of enterprises did so.

Among the enterprises that reported using cloud computing, some 79 % relied on a cloud solution for their e-mail (see Table 1). Instead of setting up a server infrastructure for their e-mail system, these enterprises opted for a cloud solution.

Use of cloud computing services in enterprises, 2021

	Use of cloud computing	E-mail	Storage of files	Office software	Security software applications	Financial or accounting software applications	Hosting the enterprise's database(s)	CRM software applications	Computing power for enterprise's own software	ERP software applications	Platform for application development, testing or deployment
	% enterprises	% enterprises using the cloud									
EU	41	79	66	61	58	47	46	27	24	24	21
Belgium	53	82	81	68	65	50	58	46	40	36	27
Bulgaria	13	80	68	60	44	32	55	21	21	24	21
Czechia	44	81	62	85	78	52	32	17	11	19	7
Denmark	65	86	83	73	80	65	72	38	43	35	40
Germany	42	65	61	55	48	40	33	21	25	18	23
Estonia	58	77	65	68	44	75	26	19	32	19	17
Ireland	59	80	69	73	54	54	40	24	12	13	16
Greece	22	84	67	73	50	34	41	28	36	28	36
Spain	31	82	80	63	62	40	69	38	35	33	28
France	29	67	76	54	51	44	59	30	22	31	25
Croatia	39	88	72	61	65	52	54	20	23	18	22
Italy	60	96	58	58	70	52	39	19	14	20	10
Cyprus	50	83	60	68	71	43	23	20	12	17	8
Latvia	29	79	54	57	41	36	49	17	22	15	17
Lithuania	34	80	58	51	52	46	42	17	33	13	22
Luxembourg	33	81	67	68	61	41	65	33	27	23	29
Hungary	26	72	61	61	45	41	44	21	32	18	17
Malta	57	89	83	80	55	51	55	33	41	22	26
Netherlands	65	82	81	72	64	66	78	49	28	35	30
Austria	40	70	71	52	49	27	26	23	24	16	28
Poland	29	79	41	64	41	30	27	17	10	22	14
Portugal	35	89	71	61	66	41	46	26	35	34	25
Romania	14	80	58	58	52	44	50	27	22	30	22
Slovenia	43	73	66	66	72	38	43	21	28	25	23
Slovakia	36	88	60	65	68	52	39	28	25	16	18
Finland	75	85	76	75	65	64	49	41	20	37	17
Sweden	75	87	84	71	64	73	60	38	43	21	27
Norway	64	88	83	78	67	69	67	38	39	33	32
Serbia	29	77	52	46	34	42	37	14	17	19	14
Turkey	11	72	71	57	46	57	37	27	35	56	29
Bosnia and Herzegovina	9	84	65	62	58	49	55	27	33	28	31

Note: Iceland: 2021 data not available. North Macedonia: 2021 data not available. Montenegro: 2021 data unreliable.

Source: Eurostat (online data code: isoc_cicce_use)

eurostat 

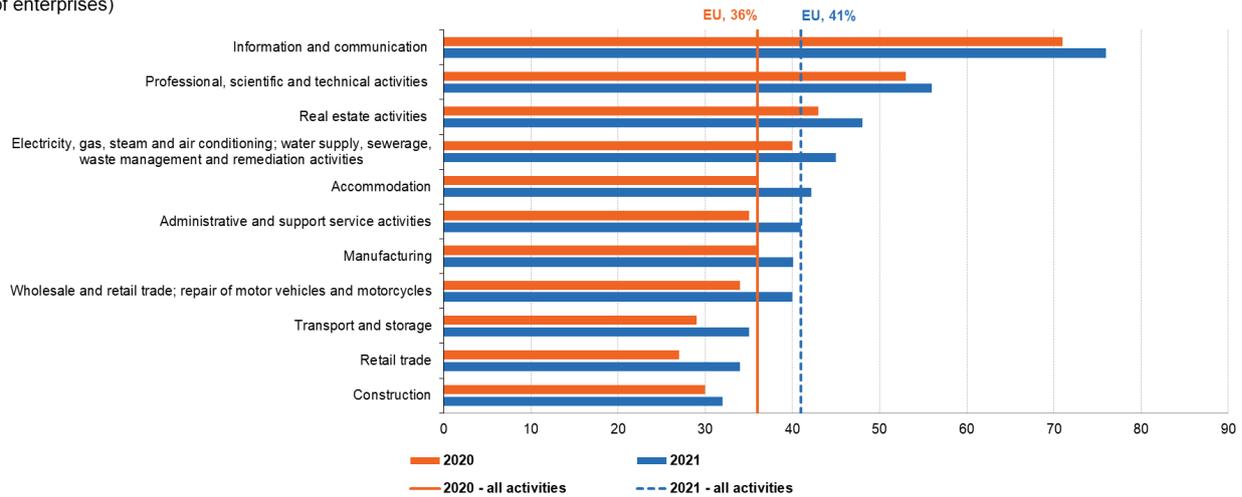
Table 1: Use of cloud computing services in enterprises, 2021 Source: Eurostat (isoc_cicce_use)

Cloud computing services may meet a wide range of other business ICT needs. More than two out of three enterprises (66 %) using the cloud used it for storing files. 61 % reported using it for office software (e.g. word processors, spreadsheets) and 58 % for security software applications, while some 46 % used it to host their database.

Most importantly, via the cloud, enterprises have access to relatively more sophisticated end customer software applications, for finances/accounting (47 %), for managing information about their customers (customer relationship management – CRM) (27 %) and for planning their processes and resources (enterprise resource planning - ERP) (24 %). In addition, 24 % reported using the (usually high-performance) cloud computing platforms for computing power in order to run their own business software applications. One in five enterprises (21 %) bought cloud computing services as computing platform providing a hosted environment for application development, testing or deployment.

Not surprisingly, the highest proportion of enterprises using cloud computing services (76 %) was in the information and communication sector, while in almost all other economic sectors the percentage was below 50 % and ranged from 32 % to 48 % (see Figure 2). 'Professional, scientific and technical' enterprises came in between, with 56 % reporting using the cloud. Compared with 2020, the increase in the use of cloud computing was highest in the retail trade sector (+7 percentage points).

Use of cloud computing services, by economic activity, EU, 2020 and 2021 (% of enterprises)



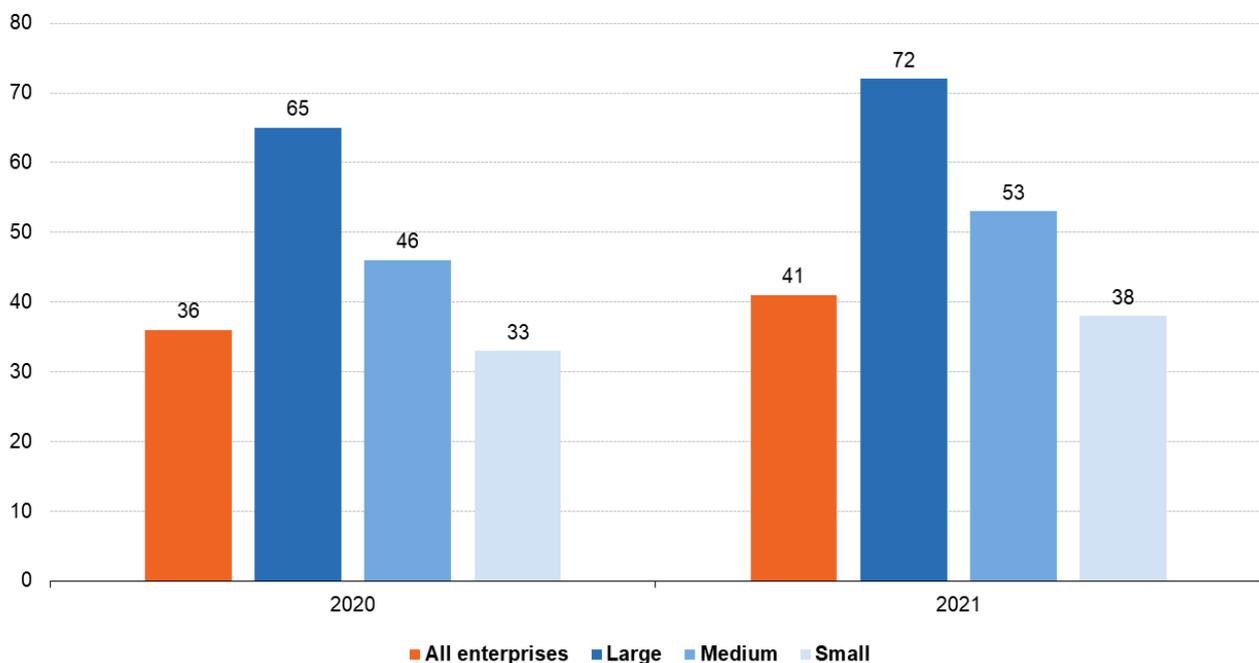
Source: Eurostat (online data code: isoc_cicce_use)

eurostat

Figure 2: Use of cloud computing services, by economic activity, EU, 2020 and 2021 (% of enterprises)
Source: Eurostat (isoc_cicce_use)

The use of cloud computing was particularly high in large enterprises where 72 % used it in 2021, i.e. an increase of 7 percentage points compared with 2020. In 2021, 53 % of medium-sized enterprises used cloud computing compared to 46 % in 2020. In small enterprises, the use of cloud computing increased by 5 percentage points to 38 % (Figure 3).

Use of cloud computing services, by size, EU, 2020 and 2021 (% of enterprises)



Source: Eurostat (online data code: isoc_cicce_use)

eurostat

Figure 3: Use of cloud computing services, by size, EU, 2020 and 2021 (% of enterprises) Source: Eurostat (isoc_cicce_use)

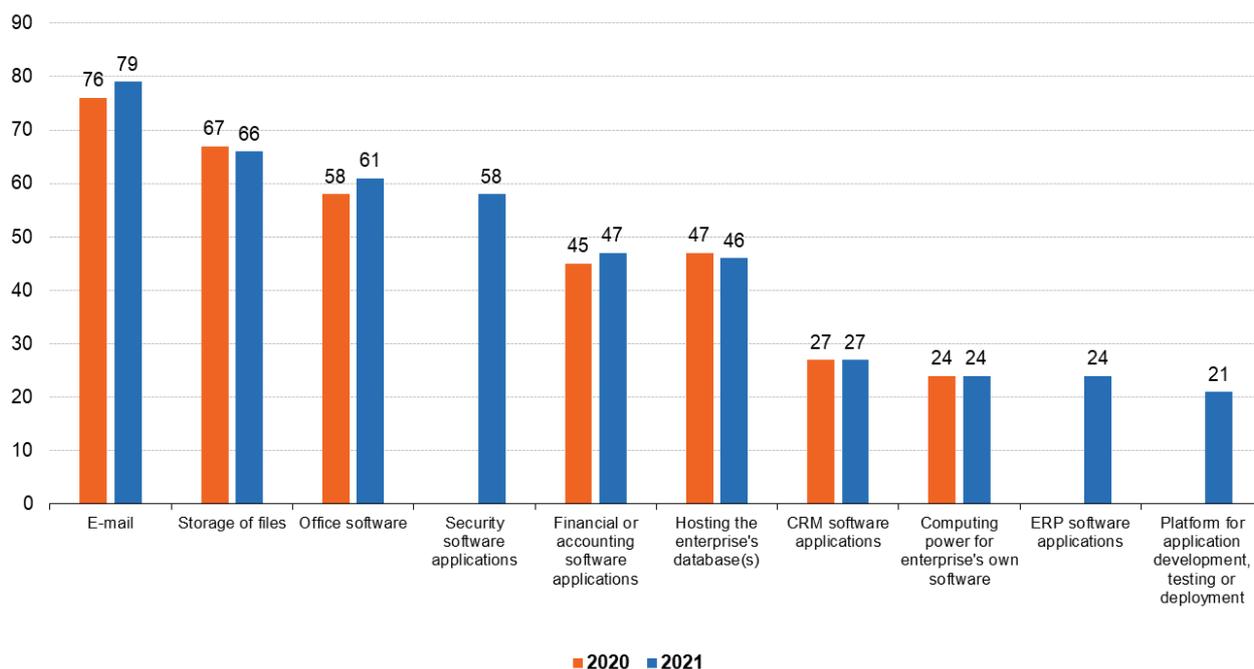
Figure 4 shows the comparison between 2020 and 2021 in the use of different types of cloud services. In 2021, the use of cloud for e-mail and storage of files is still predominant with 79 % and respectively 66 % of enterprises using

cloud computing reported buying these types of cloud services. Compared with 2020 the use of e-mail, the use of office software and of accounting and financial applications on the cloud recorded a moderate growth (+3 pp for both e-mail and office software and +2 pp for accounting applications). The use of the other types of cloud services remained more or less at the same level.

In 2021, three additional types of cloud computing services were introduced in the survey: security software applications, ERP applications and computing platform providing a hosted environment for application development, testing or deployment. Of the three, security software applications as a cloud service were the most popular among EU enterprises, with 58 % of them buying such cloud service. Only one in five (21 %) of enterprises used the platform providing a hosted environment for application development, testing or deployment over cloud.

Use of cloud computing services in enterprises, by type of cloud service, EU, 2020 and 2021

(% of enterprises using the cloud)



Source: Eurostat (online data code: isoc_cicce_use)



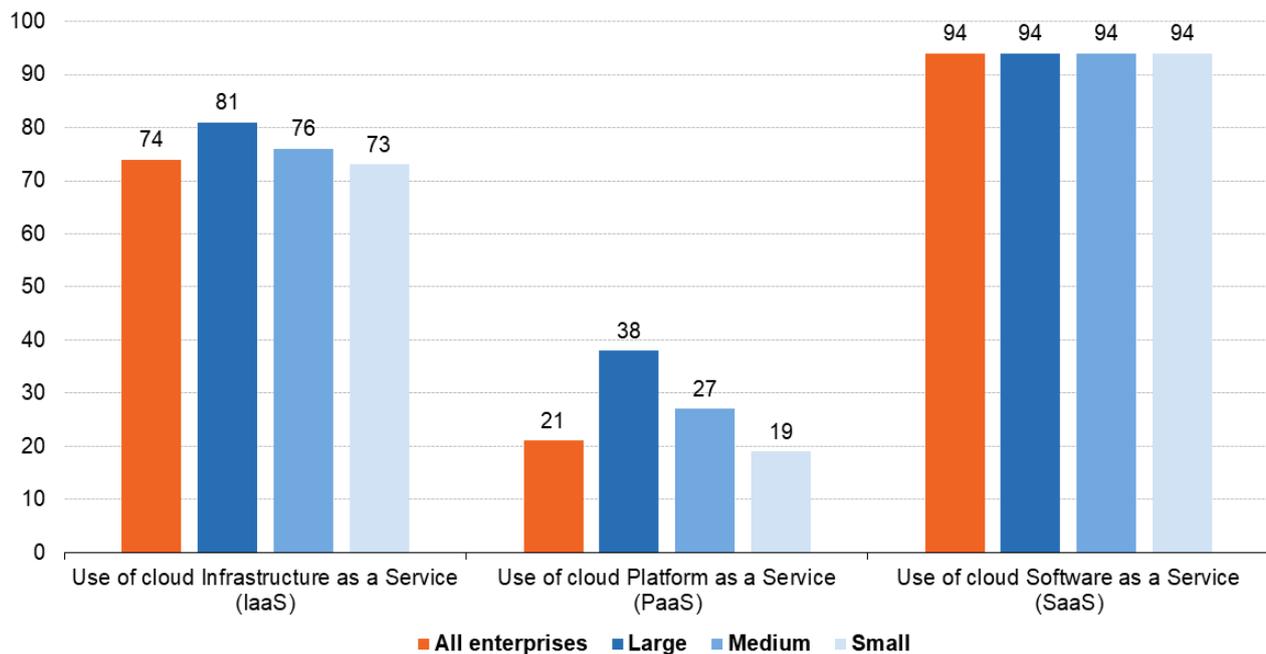
Figure 4: Use of cloud computing services in enterprises, by type of cloud service, EU, 2020 and 2021 (% of enterprises using the cloud) Source: Eurostat (isoc_cicce_use)

Use of cloud computing by service model

Of the EU enterprises purchasing cloud computing services, majority (94 %) used at least one cloud Software as a Service (SaaS), i.e. at least one of e-mail, office software, finance or accounting software applications, ERP, CRM or security software applications as a cloud service (Figure 5). Large proportion (74 %) used also at least one cloud Infrastructure as a Service (IaaS), i.e. at least one of the hosting enterprise's database, storage of files or computing power to run enterprise's own software as a cloud computing service. Only slightly over one out of five (21 %) enterprises used cloud Platform as a Service (PaaS), i.e. computing platform providing a hosted environment for application development, testing or deployment as a cloud service. While the use of SaaS was equally popular among enterprises regardless of their size, there was a slight variation among those using IaaS and PaaS among different size classes. The share of large enterprises using IaaS reached 81 % among enterprises using cloud, and was higher by 5 pp from the respective share among medium enterprises and by 8 pp higher than among small enterprises. Similarly, large enterprises used PaaS more often (38 %) than medium (27 %) or small enterprises (19 %).

Types of cloud computing services used, by service model, EU, 2021

(% of enterprises using the cloud)



Source: Eurostat (online data code: isoc_cicce_use)

eurostat

Figure 5: Types of cloud computing services used, by service model, EU, 2021 (% of enterprises using the cloud) Source: Eurostat (isoc_cicce_use)

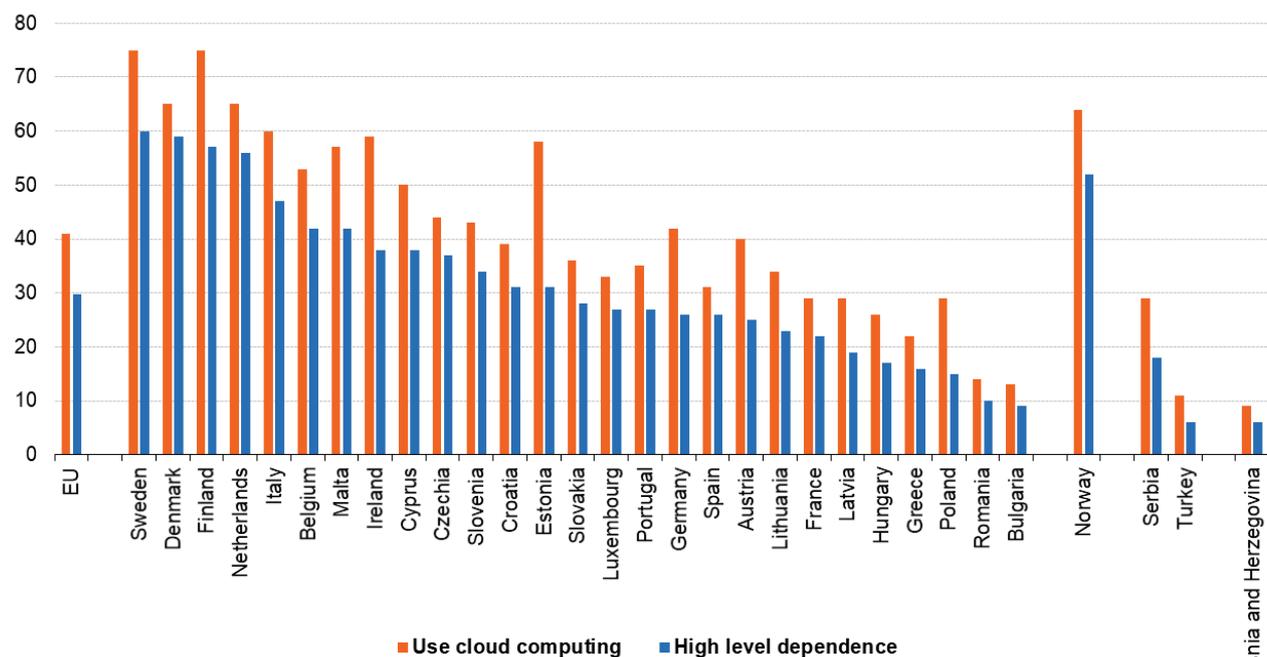
Enterprises' dependence on cloud computing

Enterprises dependence on cloud computing services can be described by level of sophistication of the cloud services they are using. Based on the survey data, the types of services have been classified into three levels: basic, intermediate and sophisticated cloud computing services. Enterprises using basic cloud services are those, which use at least one of the following services: e-mail as a cloud service, office software as a cloud service, storage of files or computing power to run enterprise's own software, and do not use any other of the services covered. Enterprises using intermediate cloud services purchase at least one of the following services: finance or accounting software application as a cloud service, ERP a software application as a cloud or CRM software application as a cloud service, but none of the sophisticated services. Enterprises using sophisticated cloud services include those, which use at least one of: security software applications, hosting enterprise's databases or computing platform providing a hosted environment for application development, testing or deployment.

41 % of EU enterprises reported using the cloud and a relatively high proportion (30 % of the total) reported using at least one of the sophisticated services and were hence classified as highly dependent on cloud services (see Figure 6). The highest proportion of enterprises highly dependent on cloud services were recorded in Sweden (60 %), Denmark (59 %), Finland (57 %) and the Netherlands (56 %).

Use of cloud computing services and high level dependence on the cloud, 2021

(% of enterprises)



Note: Iceland: 2021 data not available. North Macedonia: 2021 data not available.
Montenegro: 2021 data unreliable.

Source: Eurostat (online data code: isoc_cicce_use)

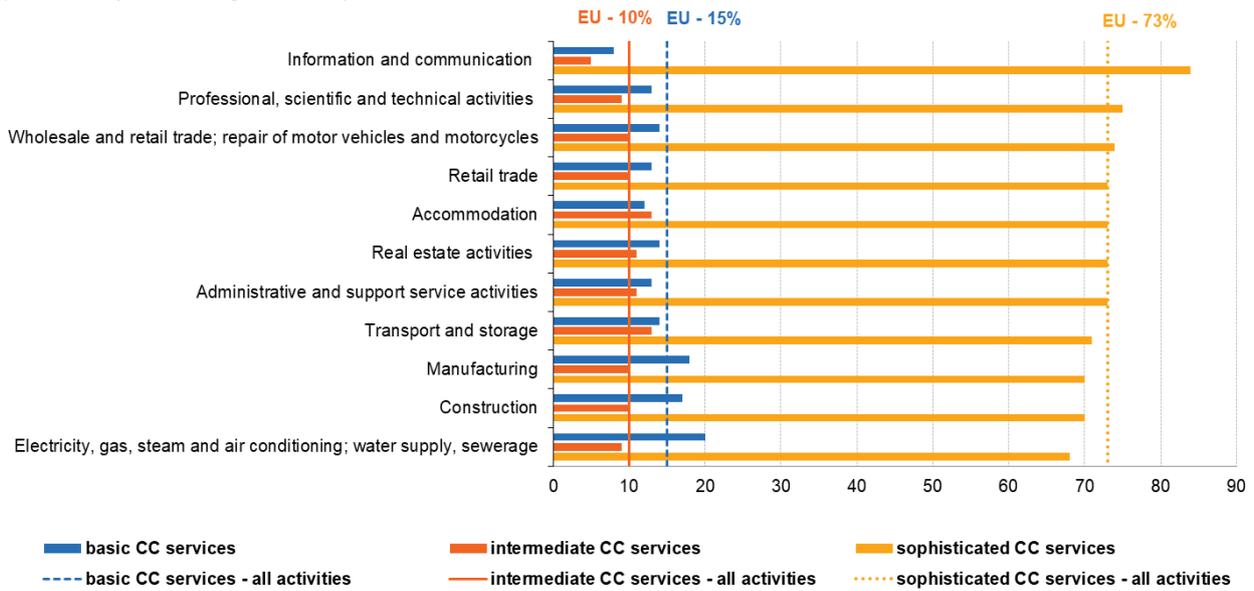
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Bosnia and Herzegovina

Figure 6: Use of cloud computing services and high level of dependence on the cloud, 2021 (% of enterprises) Source: Eurostat (isoc_cicce_use)

In 2021, among enterprises that used cloud computing services, 73 % were 'highly dependent' on cloud, using sophisticated cloud services, while 10 % were using intermediate level cloud services and 15 % of enterprises relying only on the basic cloud services (see Figure 7). While in all sectors, majority of enterprises using cloud purchased the most advanced cloud services, the highest proportion of enterprises using sophisticated cloud services was in information and communication (84 %). On the other hand, the lowest proportion of enterprises buying sophisticated services was in electricity, gas, steam and air conditioning, water sector (68 %), with the highest percentage (20 %) of enterprises using cloud relying only on basic cloud services.

Level of sophistication of cloud computing services used, by economic activity, EU, 2021
 (% of enterprises using the cloud)



Source: Eurostat (online data code: isoc_cicce_use)

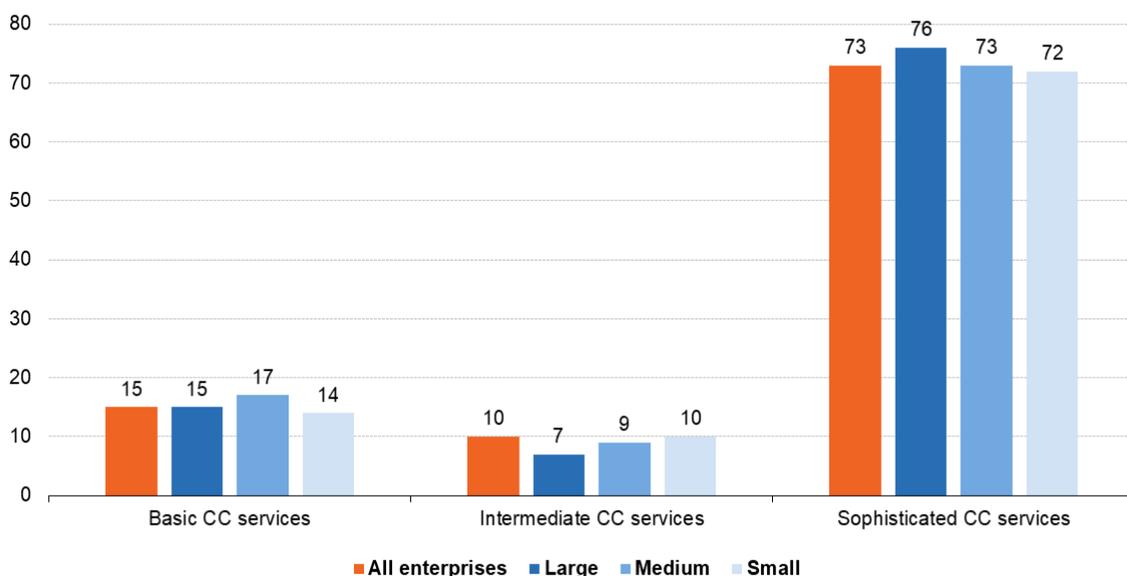


Figure 7: Level of sophistication of cloud computing services used, by economic activity, EU, 2021 (% of enterprises using the cloud) Source: Eurostat (isoc_cicce_use)

The degree of dependence on cloud computing varied only slightly among enterprises of different size classes. The sophisticated cloud computing services were used by 76 % of large enterprises that used cloud computing services compared to 73 % and 72 % of medium and small enterprises that used cloud computing services respectively (Figure 8).

Level of sophistication of cloud computing services used, by size, EU, 2021

(% of enterprises using the cloud)



Source: Eurostat (online data code: isoc_cicce_use)

eurostat 

Figure 8: Level of sophistication of cloud computing services used, by size, EU, 2021 (% of enterprises using the cloud) Source: Eurostat (isoc_cicce_use)

Source data for tables and graphs

- [Tables and graphs for Cloud computing](#)

Data sources

The data in this article are based on the results of the 2020 and 2021 surveys on ICT usage and e-commerce in enterprises. The statistics were obtained from enterprise surveys conducted by national statistical authorities. The statistical observation unit is the enterprise, as defined in Regulation (EEC) No 696/93. The survey covered enterprises with at least 10 employees and self-employed.

The economic activities referred to are defined in the EU's [NACE](#) classification, Revision 2. The sectors covered are manufacturing, electricity, gas and steam, water supply, construction, wholesale and retail trades, repair of motor vehicles and motorcycles, transportation and storage, accommodation and food service activities, information and communication, real estate, professional, scientific and technical activities, administrative and support activities, and the repair of computers and communication equipment. Enterprises are broken down by size, into small (10-49 employees and self-employed), medium (50-249) and large (250 or more).

In 2021, 148 000 of the 1.5 million enterprises in the EU were surveyed. Of the 1.5 million enterprises, approximately 83 % were small enterprises (10-49 employees and self-employed), 14 % medium (50-249) and 3 % large (250 or more). The data extracted for this article may differ from those in the Eurostat database where the latter may have since been updated.

Context

[A Europe fit for the digital age](#) is a major priority of the European Commission. The strategy is built on three pillars: (1) Technology that works for the people; (2) A fair and competitive digital economy; (3) An open, democratic and sustainable society.

Cloud computing is one of the strategic digital technologies considered important enablers for productivity and better services. Enterprises use cloud computing to optimise resource utilisation and build business models and

market strategies that will enable them to grow, innovate and become more competitive. [The Digital Services Act](#) and [European data strategy](#) aim to enable and facilitate a faster adoption of cloud computing across all sectors of the economy; this can cut ICT costs and, when combined with new digital business practices, boost productivity, growth and jobs.

Other articles

- [E-business integration](#)
- [E-commerce statistics](#)
- [ICT security in enterprises](#)
- [Social media - statistics on the use by enterprises](#)
- [ICT specialists - statistics on hard-to-fill vacancies in enterprises](#)
- [Digital economy and society statistics - enterprises](#)

Tables

- [Digital economy and society](#)

Database

- [Digital economy and society](#)

Dedicated section

- [Digital economy and society](#)

Methodology

- [ICT usage and e-commerce in enterprises](#) (ESMS metadata file — `isoc_e_esms`)

Legislation

- [Regulation \(EU\) 2019/2152 of the European Parliament and of the Council of 27 November 2019 on European business statistics](#)
- [Regulation \(EC\) No 808/2004 of the European Parliament and of the Council of 21 April 2004 concerning Community statistics on the information society](#)
- [Regulation \(EC\) No 960/2008 of 30 September 2008 implementing Regulation \(EC\) No 808/2004 concerning Community statistics on the information society](#)
- [Regulation \(EC\) No 1023/2009 of 29 October 2009 implementing Regulation \(EC\) No 808/2004 concerning Community statistics on the information society](#)
- [Regulation \(EU\) No 821/2010 of 17 September 2010 implementing Regulation \(EC\) No 808/2004 concerning Community statistics on the information society](#)
- [Regulation \(EU\) No 937/2011 of 21 September 2011 implementing Regulation \(EC\) No 808/2004 concerning Community statistics on the information society](#)
- [Regulation \(EU\) No 1083/2012 of 19 November 2012 implementing Regulation \(EC\) No 808/2004 concerning Community statistics on the information society](#)
- [Regulation \(EU\) No 859/2013 of 5 September 2013 implementing Regulation \(EC\) No 808/2004 concerning Community statistics on the information society](#)

- Regulation (EU) No 1196/2014 of 30 October 2014 implementing Regulation (EC) No 808/2004 concerning Community statistics on the information society
- Regulation (EU) 2015/2003 of 10 November 2015 implementing Regulation (EC) No 808/2004 concerning Community statistics on the information society
- Regulation (EU) 2016/2015 of 17 November 2016 implementing Regulation (EC) No 808/2004 concerning Community statistics on the information society
- Regulation (EU) 2017/1515 of 31 August 2017 implementing Regulation (EC) No 808/2004 concerning Community statistics on the information society
- Regulation (EU) 2018/1798 of 21 November 2018 implementing Regulation (EC) No 808/2004 of the European Parliament and of the Council concerning Community statistics on the information society for the reference year 2019
- Regulation (EU) 2019/1910 of 7 November 2019 implementing Regulation (EC) No 808/2004 of the European Parliament and of the Council concerning Community statistics on the information society for reference year 2020
- Regulation (EU) 2020/1030 of 15 July 2020 laying down the technical specifications of data requirements for the topic 'ICT usage and e-commerce' for the reference year 2021, pursuant to Regulation (EU) 2019/2152 of the European Parliament and of the Council
- Regulation (EU) 2021/1190 of 15 July 2021 laying down the technical specifications of data requirements for the topic 'ICT usage and e-commerce' for the reference year 2022 pursuant to Regulation (EU) 2019/2152 of the European Parliament and of the Council
- Regulation (EC) No 696/1993 of 15 March 1993 on the statistical units for the observation and analysis of the production system in the Community

External links

- [Digital Agenda for Europe](#)