Client–server and peer-to-peer

Computer systems (Paper 1) · revision notes

The two ways computers can be organised on a network: client–server, where servers provide services to clients, and peer-to-peer, where all computers have equal status. Questions ask you to describe the roles of the computers, compare the two models and recommend one for a given scenario.

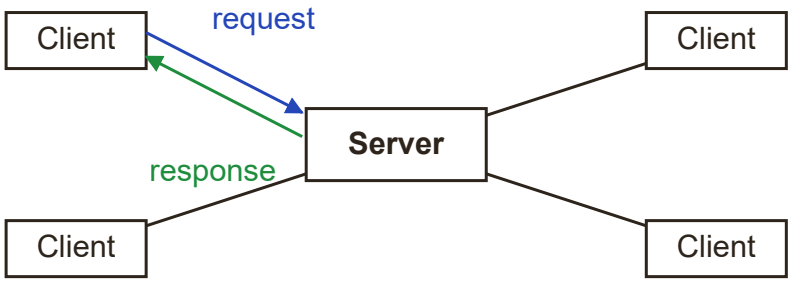
Key facts

- Server: provides services or resources (files, printing, email, web pages, logins)
- Client: requests services from a server
- Client–server: central management, backups and security; costs more; server is a single point of failure
- Peer-to-peer: equal status, no central server; each peer is both client and server
- Peer-to-peer: cheap and easy to set up; no central backups or central security
- Web browsing is client–server: browser = client, web server = server

Notes

Client–server networks

- One or more **servers** provide services to the other computers, called **clients**. Examples: file storage, printing, email, web pages, user logins and backups.
- A client sends a **request**; the server processes it and sends back a **response**. A web browser and a web server work like this.

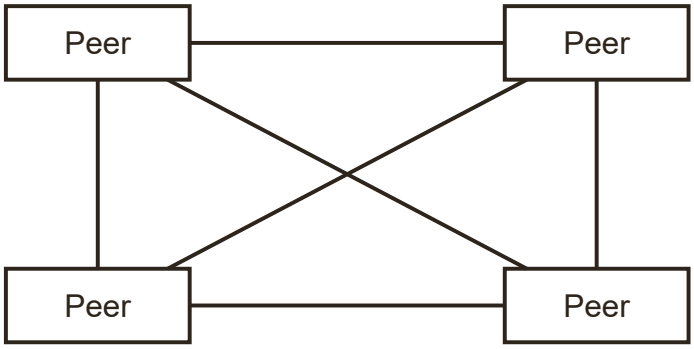


Client–server: clients send requests to a central server, which sends responses

- Everything is **managed centrally**: user accounts, passwords and access levels, backups and software updates.
- Servers are powerful, but they cost more than ordinary computers, and a network manager is often needed.
- If a server fails, clients cannot use its services (a **single point of failure**). If too many clients send requests at once, the server can become overloaded.

Peer-to-peer networks

- All computers have **equal status**. There is no central server.
- Each computer (a **peer**) can act as both a client and a server, sharing its own files and printers directly with other peers.



Peer-to-peer: no server; every peer can share its own files with the others

- Cheap and easy to set up: there is no server to buy and no specialist is needed. Suitable for a few computers, such as a home network.
- There are no central backups or central security, so each computer must be managed separately. Files may be spread across many computers, which makes them hard to find and keep up to date.
- A peer that holds a shared file must be switched on for others to use it, and it can slow down while other peers access it.
- Peer-to-peer file sharing over the Internet splits a large file into pieces. Each user downloads different pieces from many peers at once and uploads pieces to others, so no single server has to supply the whole file. Grade 7+ only

Choosing a model

- Many computers, sensitive data or a need for central backups → **client–server** (e.g. a school, hospital or business).
- A few computers, a small budget and no sensitive data → **peer-to-peer** (e.g. a family at home).

How to answer each type of question

State the roles of a client and a server 1 to 2 marks Grade 3

1. Server: say that it provides a service and give an example.
2. Client: say that it requests a service from the server.

Example. State the role of a server and the role of a client in a client–server network. [2]

Model answer. The server provides services or resources to the clients, e.g. storing files or checking logins (1). The client requests services or resources from the server (1).

Describe advantages or disadvantages of a model

2 to 4 marks | Grade 5

1. Name the advantage or disadvantage (1 mark).
2. Explain its effect on the users or the organisation (1 mark).
3. Keep each point about the model named in the question.

Example. Describe **two** disadvantages of a peer-to-peer network. [4]

Model answer. There is no central backup (1), so each user must back up their own files, and work could be lost if one computer fails (1). Security is not managed centrally (1), so each computer must be set up separately and it is hard to control who can access which files (1).

Recommend a model for a scenario

4 to 6 marks | Grade 7

1. Pick out the key facts: number of computers, budget, type of data, need for backups.
2. Give points about both models, applied to the scenario.
3. Make a clear recommendation and justify it using the scenario.

Example. A small architecture firm has 15 computers. Staff work on shared drawings that are updated every day. The drawings are valuable and must not be lost.
Recommend whether the firm should use a client–server or a peer-to-peer network. Justify your recommendation. [6]

Model answer. Client–server stores the drawings centrally on the server (1), so every member of staff works on the same, up-to-date version (1). All the drawings can be backed up from the server in one go (1), so they are not lost if a computer fails (1). Client–server costs more because a server must be bought and managed, whereas peer-to-peer would be cheaper (1). Recommendation: client–server, because protecting the valuable drawings and keeping them up to date is worth the extra cost (1).

Don’t lose marks

- Saying peer-to-peer has 'no security'. Each computer can still use passwords; the point is that security is not managed centrally.
- Describing a server only as 'the main computer that controls everything'. Say what it provides: files, printing, logins, backups.
- Listing features of client–server without saying why they matter to the organisation in the question.
- Forgetting that client–server has disadvantages too: cost, a network manager and a single point of failure.

More tips

Memory tricks

- Server = serves (gives). Client = customer (asks).
- Peer = equal, like classmates in a peer group: nobody is in charge.
- Scenario check: 'sensitive data', 'backups', 'many users' → client–server; 'cheap', 'few computers', 'home' → peer-to-peer.

Exam technique

- In recommendation questions, a one-sided answer loses marks: mention at least one drawback of your chosen model.
- Use the organisation's details (e.g. 'patient records', 'four computers') in every point.
- 'Describe two advantages' is usually 4 marks: one mark for each advantage and one for explaining it.

What each grade needs

What you need to be able to do, from the first marks up to the top grade.

Grade 3 — **State the role of a server**
A server provides services or resources, such as files, printing, email or web pages, to clients.

Grade 3 — **State the role of a client**
A client requests services or resources from a server.

Grade 4 — **Describe a peer-to-peer network**
All computers have equal status and share resources directly with each other, with no central server.

Grade 5 — **Give advantages and disadvantages of each model**
E.g. client–server has central backups and security but costs more and the server is a single point of failure.

Grade 6 — **Explain why a model suits a scenario**
Link features such as cost, central backups or security to the needs of the organisation described.

Grade 7 — **Recommend and justify a network model**
Weigh cost, number of computers, security and backups for the organisation, then give a justified recommendation.

Free notes, Full packs, practice papers and mock exams at chhetriacademy.com. Written for this site; not taken from past papers. Stuck? 1-to-1 tutoring with a free 30-minute trial lesson.