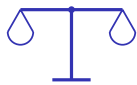


Ethics & Ownership

AS Computer Science ■ Topic 7

A-Level Computer Science



Ethics & Ownership

What we will cover

- 1 Professional ethics
- 2 Copyright & patents
- 3 Software licences
- 4 Artificial intelligence
- 5 Recap



1 Ethics

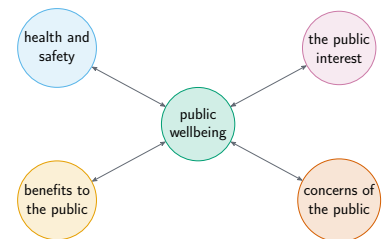
Ethics & Ownership

└ Ethics

Why ethics matters

A **computing professional** 计算机专业人员 builds software, systems, networks and data that affect people who **cannot judge the work themselves**. So the profession shares a code of **ethics** 伦理 – BCS, ACM and IEEE each publish one:

- **trust** – users rely on professionals
- **impact** – software runs medical, banking, vehicles



Ethics & Ownership

└ Ethics

Computing has an environmental cost



E-waste 电子垃圾 grows fastest of any waste stream: short replacement cycles, toxic metals, much of it exported. Data centres add the electricity on top.

Ethics & Ownership

└ Ethics

Principles in practice

- **public interest** first – safety, health, the environment
- **honesty and competence**: be honest about your skills, never claim expertise you lack
- **confidentiality** 保密性 – protect a client's or employer's private information
- avoid **conflicts of interest** 利益冲突
- respect **intellectual property** 知识产权 & **privacy** 隐私

Biased AI hiring tool

It sorts CVs fast but rejects more older applicants. **Hold it back** until the bias is fixed – fairness before convenience.

Ethics & Ownership

Ethics

Acting ethically vs unethically

Acting **ethically** protects users, strengthens reputation, reduces legal risk, and builds trust. **On a borderline call:** name whose interests are affected → check the code of ethics *and* the law → weigh the consequences → ask a trusted senior → write down what you decided and why.

Acting **unethically** (skipping testing, hiding bugs, misusing data) can harm real users, lead to dismissal or legal action, damage reputation, and erode trust in technology generally.

Ethics & Ownership

Ethics

Your call: ethical or not?

a serious bug is found just before release; the manager says "ship it anyway" – you stay silent

you reuse a well-tested open-source library, keep its licence and credit the authors

a client's private data would make a great demo – you show it at a conference

public safety & interest come first

intellectual property respected

confidentiality broke

Discarded electronics (e-waste) are a growing environmental cost of computing

In an exam answer: **name the principle**, then apply it to the scenario.

2

Ownership

Ethics & Ownership

Ownership

Copyright and patents

- **copyright** 版权: automatic, ~70 yr – covers code, images, text
- **patent** 专利: must be filed, ~20 yr – covers inventions & algorithms
- without it anyone could copy software freely, the developer would not be paid, and plagiarism would be legal

copyright automatic – no registration
lasts ~70 years after the creator's death (code, images, documents)

patent must be filed ~20 years (inventions, new algorithms)

Ethics & Ownership

Ownership

Software licences

sell it / keep control?

yes

commercial

share the source code?

yes

open-source

free forever?

yes

freeware

no (trial)

shareware

Type	Cost	Source	Modify
commercial 专有	paid	no	no
open-source 开源	free	yes	yes*
freeware 免费软件	free	no	no
shareware 共享软件	trial	no	no

A **software licence** 软件许可证 is a contract granting use on the owner's terms. **Commercial** software is sold per user, so the developer keeps revenue and control – Microsoft Office, Adobe Photoshop, most games. Open-source splits two ways: **permissive** (MIT, BSD) allows almost any use, **copyleft** 著佐权 (GPL) requires modified versions to carry the same licence.

***copyleft** 著佐权 (GPL): share modified versions alike.

Ethics & Ownership

Ownership

Choosing a licence, and justifying the choice

proprietary

source withheld, use restricted – chosen for **revenue** and control

open-source

source published and modifiable – chosen when the developer wants it **widely used and improved by the community**

freeware

free to use, source withheld – chosen for reach, often to sell something else

shareware

free to try, then paid – chosen to let the product sell itself

how to justify

link the licence to the **developer's goal** (revenue, reach, community), the **user's needs** (cost, customising), and the **use case**

"Open-source is better" scores nothing. Name whose goal it serves and why that goal fits this scenario.

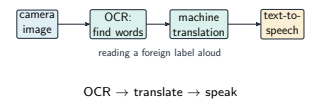
3 Artificial intelligence

Ethics & Ownership
└ Artificial intelligence

Artificial intelligence

AI 人工智能 does tasks once needing human intelligence. Most uses **machine learning** 机器学习 – learning patterns from data.

- understand: **speech** 语音识别, **image recognition** 图像识别
- decide: translation, recommendations, self-driving



Ethics & Ownership
└ Artificial intelligence

What modern AI is, and where it appears

machine learning 机器学习	algorithms that improve at a task by learning patterns from large amounts of data, rather than following rules written by hand.
neural networks 神经网络	layered models loosely inspired by neurons; deep learning 深度学习 means many such layers
OCR 光学字符识别	optical character recognition – reading printed or handwritten text
text-to-speech 文字转语音	and speech recognition in the other direction
autonomous vehicles 自动驾驶汽车	and robots, combining vision, planning and control

The shift is from **rules written by a programmer** to **patterns learned from data**. Every benefit and every concern below follows from that one change.

Ethics & Ownership
└ Artificial intelligence

Everyday examples

AI tasks split into two kinds – **understanding input**, and **producing output or decisions**.

- **speech recognition** 语音识别 – spoken words to text (voice assistants).
- **image recognition** 图像识别 – finding objects, faces or text in images.
- **machine translation** 机器翻译 – automatic translation between languages.
- **recommendation systems** 推荐系统 – suggesting products, videos or music.

Ethics & Ownership
└ Artificial intelligence

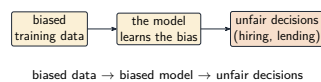
AI: benefits and concerns

Benefits:

- accessibility & productivity
- spots patterns in huge data

Concerns:

- **bias** 偏见, privacy, transparency
- accountability, misuse



Ethics & Ownership
└ Artificial intelligence

AI: the benefits and the concerns

speed and scale	processes far more data than people can, and does not tire
decision support	spots patterns in huge datasets – medical diagnosis, fraud detection
always available	and personalised to each user
job displacement	AI may replace some roles, and change many more
bias	a model trained on biased data reproduces that bias at scale
transparency and misuse	large models are "black boxes" hard to explain; and deepfakes, misinformation and surveillance are real uses

Answer in **pairs**: each benefit has a matching concern, and the exam marks the balance rather than the length of either list.

Exam tips

- Answer ethics questions against a **professional code of conduct** (public interest, competence, honesty), not personal opinion.
- Distinguish **copyright** (protects the expression) from a **patent** (protects an invention).
- Compare software licences: proprietary, open-source, freeware, shareware and FOSS.

4

Recap

Topic 7 – key takeaways

1 Ethics

public interest first; honesty; confidentiality

2 Copyright

automatic; patents cover inventions

3 Licences

commercial, open-source, freeware, shareware

4 AI

learns from data; beware bias & accountability

Check yourself

- 1 Does copyright need registration?
- 2 Which licence shares its source code?
- 3 What is "copyleft" (GPL)?
- 4 How does bias get into an AI system?



Answers 1. no (automatic) 2. open-source 3. modified versions stay open 4. from biased training data