

Computing concepts

Python Reference

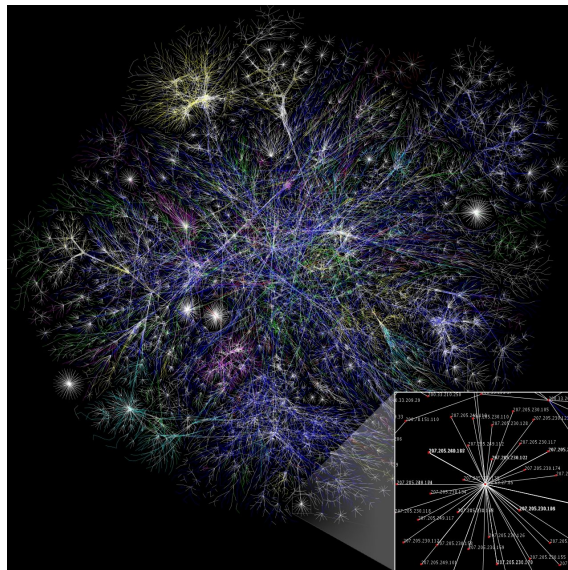
What computing is & the design cycle

Computing means solving problems with computers: input, process, output. Good software is built in a design cycle — plan, write, test, improve — repeated many times.

- Break a problem down, build a small part, test it, then add more.
- Programmers work in teams and reuse each other's code.

The Internet

The Internet is a network of networks. Data is split into packets that travel separately and are put back together at the other end. Shared rules called protocols (such as TCP/IP) make this work. If one path breaks, packets take another route — this is redundancy , which gives fault tolerance .



A map of the Internet: each line is a path between two networks

Layer	Job
HTTP	request and send web pages
TCP	reliable delivery, in order
IP	addressing and routing

Parallel & distributed computing

Sequential code does one step at a time. Parallel computing does several steps at once on many cores , which can give a speedup . Distributed computing spreads the work across many computers, such as a cloud.

- Not everything can run in parallel: some steps must wait for an earlier result.

Impact of computing

Computing brings both benefits and harms. The digital divide means not everyone has equal access to it. Software can carry bias from the data it learns from. Respect intellectual property (licences), and protect people's personal data and privacy .

Common mistakes

- The Internet and the World Wide Web are not the same: the Web is one service that runs on top of the Internet.
- More processor cores help only if the work can be split into parts that run at the same time.