Computing concepts

Python Reference

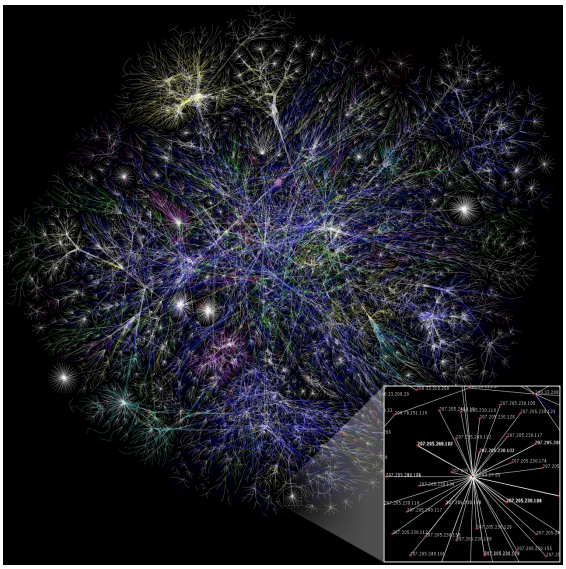
What computing is & the design cycle

Computing 计算 means solving problems with computers: input, process, output. Good software is built in a design cycle 设计循环—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 互联网 is a network 网络 of networks. Data is split into packets 数据包 that travel separately and are put back together at the other end. Shared rules called protocols 协议 (such as TCP/IP) make this work. If one path breaks, packets take another route —this is redundancy 冗余, which gives fault tolerance 容错.



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 顺序 code does one step at a time. Parallel 并行 computing does several steps at once on many cores 核心, which can give a speedup 加速. Distributed 分布式

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 数字鸿沟 means not everyone has equal access to it. Software can carry bias 偏见 from the data it learns from. Respect intellectual property 知识产权 (licences), and protect people's personal data 个人数据 and privacy 隐私.