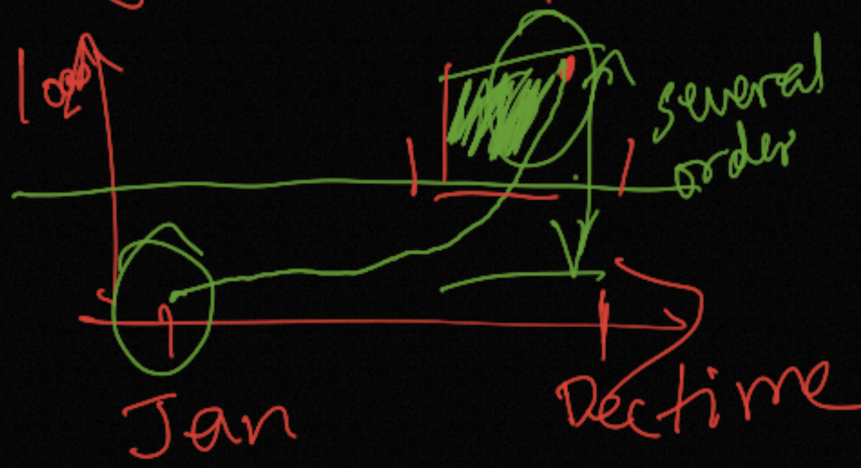
Advanced Challenges in Web Technologies

Or, Engineering Internet-Scale Systems

Examples of Internet-scale systems

Microsoft, Apple, IBM

- **facebook** → 2.4 billion users every day → 1/4 world!
- **Amazon** → fast high street
- **Netflix** → 1/3 bytes in USA
- **Google** → catalogues, indexes and makes them searchable



Characterstics of Internet-scale systems

1. users
2. elasticity of demand ✓
3. content delivery
4. Data

"ilities" → capabilities

→ Availability

(Why did Netflix succeed when BitTorrent failed)

→ Scalability

(elasticity of demand)

Characterstics of LARGE Software systems

→ Operating Systems → millions of lines of code
→ Banking software
→ Military & defence systems

Similarities

- Huge codebase
  → different language
- Built overtime
  → legacy software
  → Hardware maintenance

How to maintain large codebases

Differences

→ No version
Updates are transparent
→ Dont (typically) have multiple users
→ Data

How to handle data at internet scale.

Complexity takes over the game

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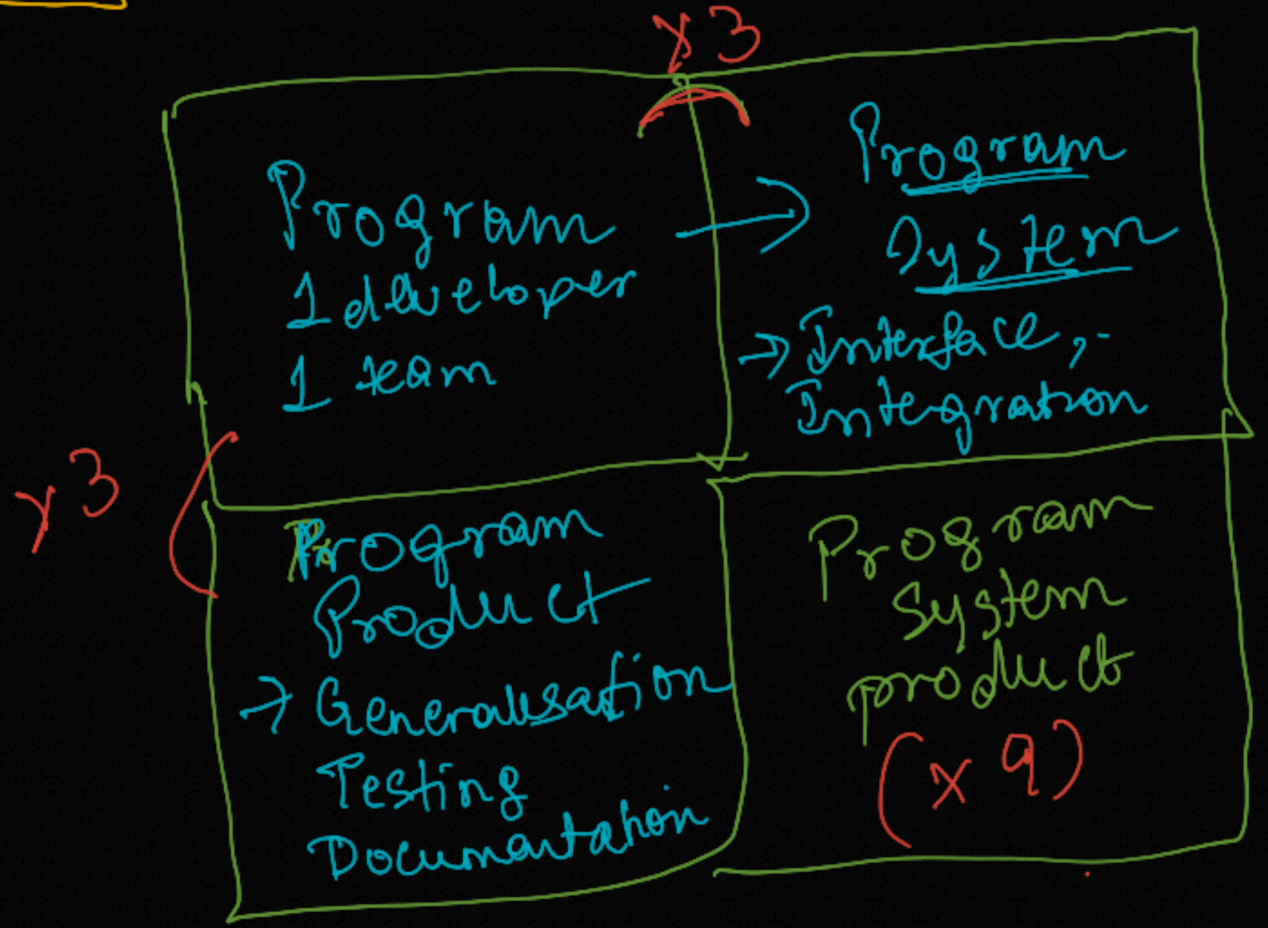

1960s
Fred Brooks
{ "Mythical Man Month" }

– Process
– Data

Data data everywhere... Nor any drop to analyse

→ Data deluge is not new
(RDMS were developed to deal this)

→ Internet data does not fit in into Relational structure

→ How to deal with semi structured or non-structured data

Innovations made in Internet-Scale Systems

98 machines free from Jan – Oct?

Cloud → elasticity

→ Web technologies come in different language

Go | Ruby | Perl

REST API : Service based ; Microservices Docker

→ CI / CD Continuous Integrations kubernetes

→ Version ing → Version management ; Software appliance

→ Github