Tracking Microservice System Evolution with Correlation Networks

Giles Winchester
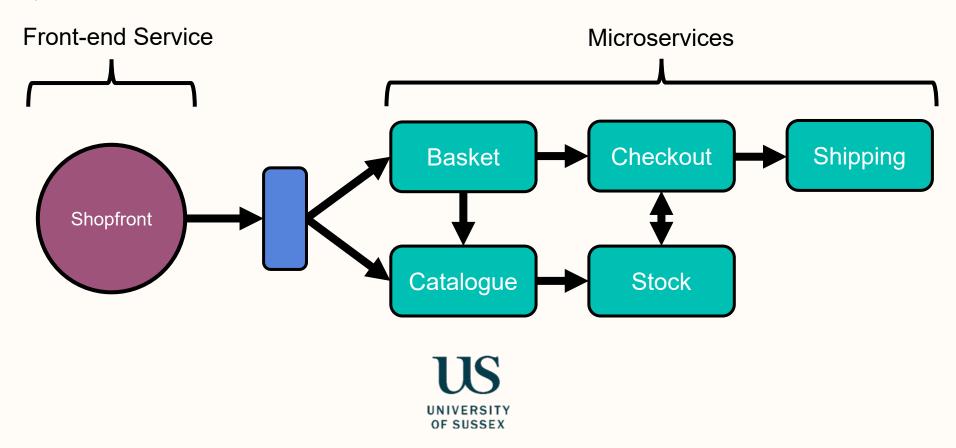
Supervisors:

Prof. Luc Berthouze and Prof. George Parisis

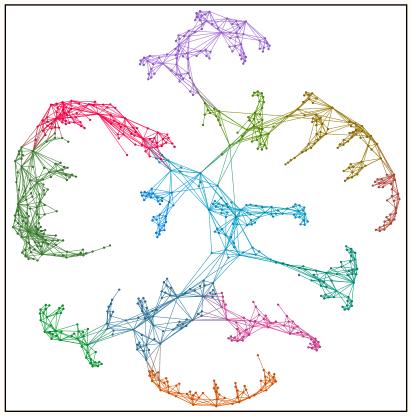35th Multi-Service Networks Workshop

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Microservice Systems

- Architectural approach that composes an application as a collection of loosely coupled, fine-grained, services.

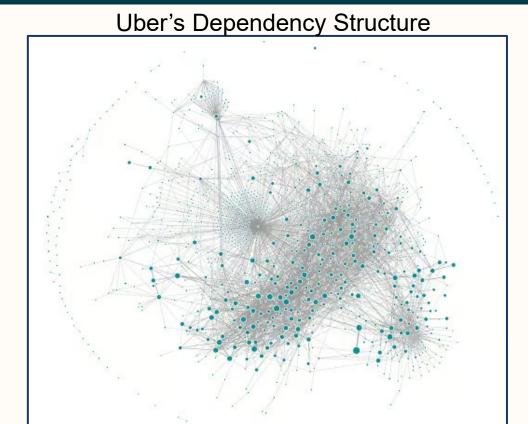Front-end Service

Microservices

Shopfront

Basket → Checkout → Shipping

Catalogue → Stock

Microservice Complexity

Alibaba's Correlation Structure

NB only 0.2% of microservices from a single cluster

Uber's Dependency Structure
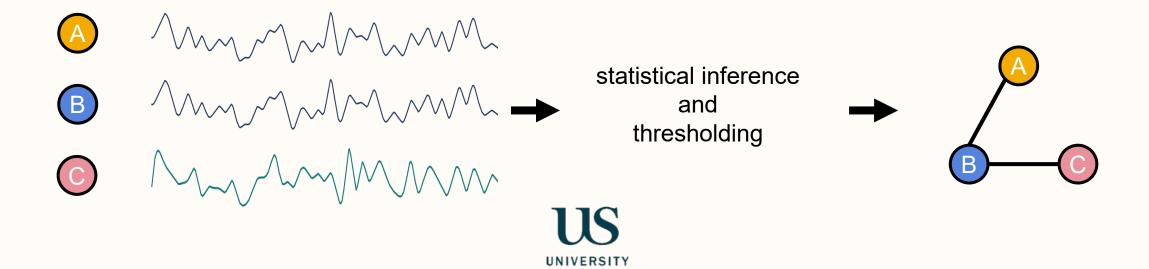

[1] Gluck, Uber Blogs, 2020.

Microservice Tracing

- Very power information as to the ongoings within your microservice system.

- **However:**

- For large scale systems tracing and storing all requests is extremely expensive.

- Alibaba (samples traces at 0.5%)
  - 5M calls per minute for 10 production clusters

- Exerts an overhead on the system.

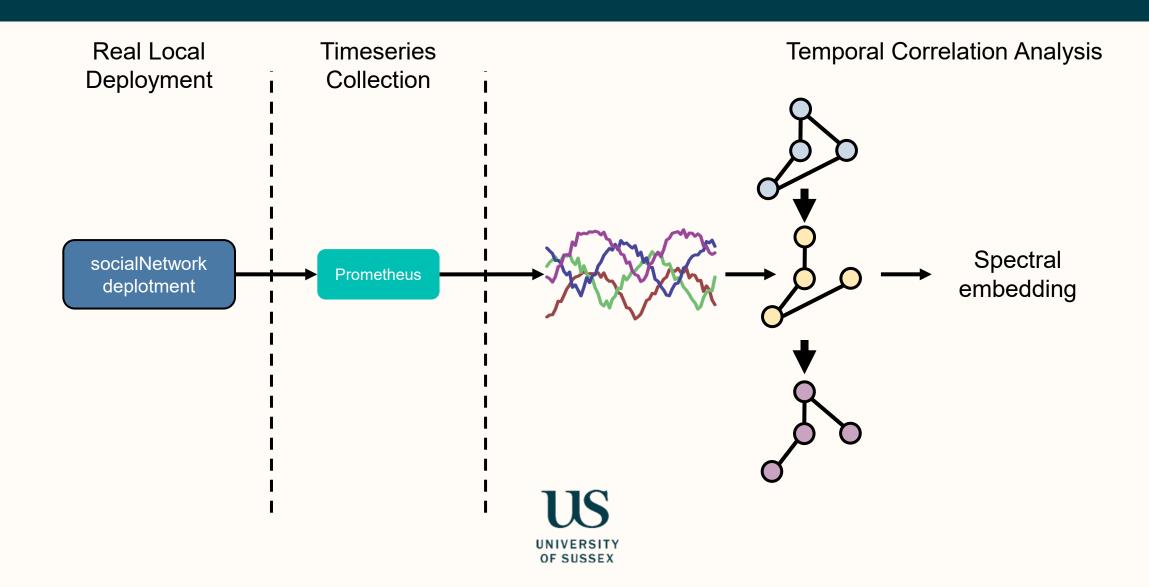- Not all microservices are provisioned for tracing.

Correlation Networks

- An approach employed for studying many complex systems.
  - Finance, ecology, genomics, social sciences, neuroscience

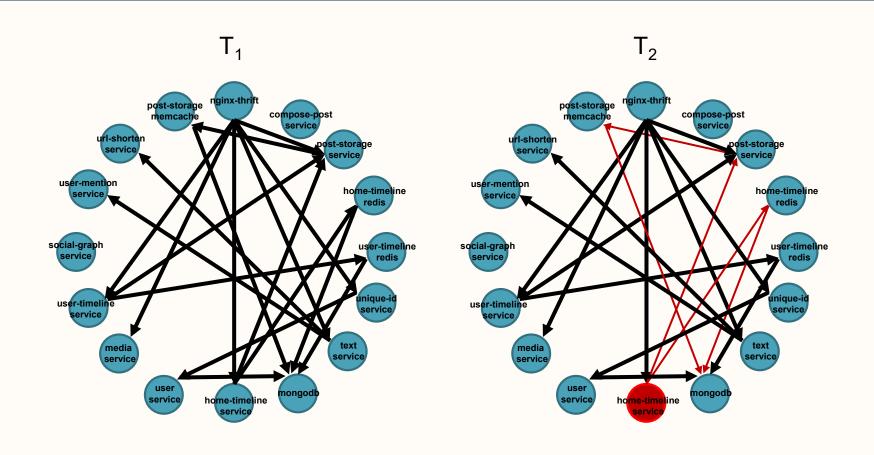- Graphical representations where nodes represent variables and edges represent the correlation between variables.

statistical inference and thresholding
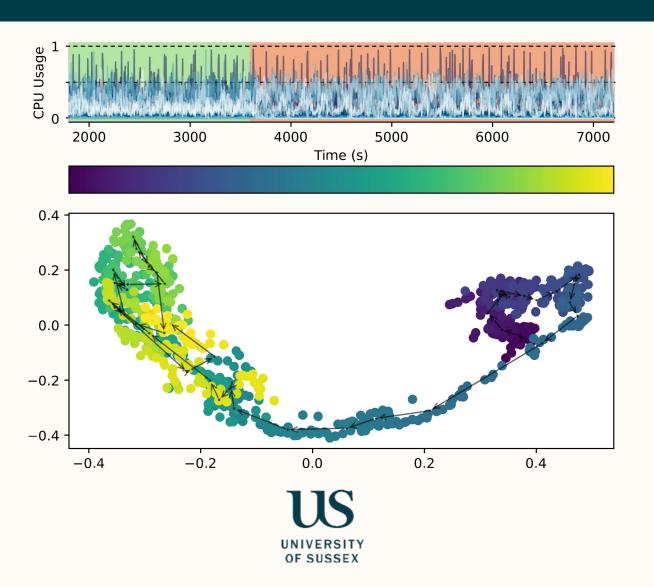
Microservices & Correlation Networks
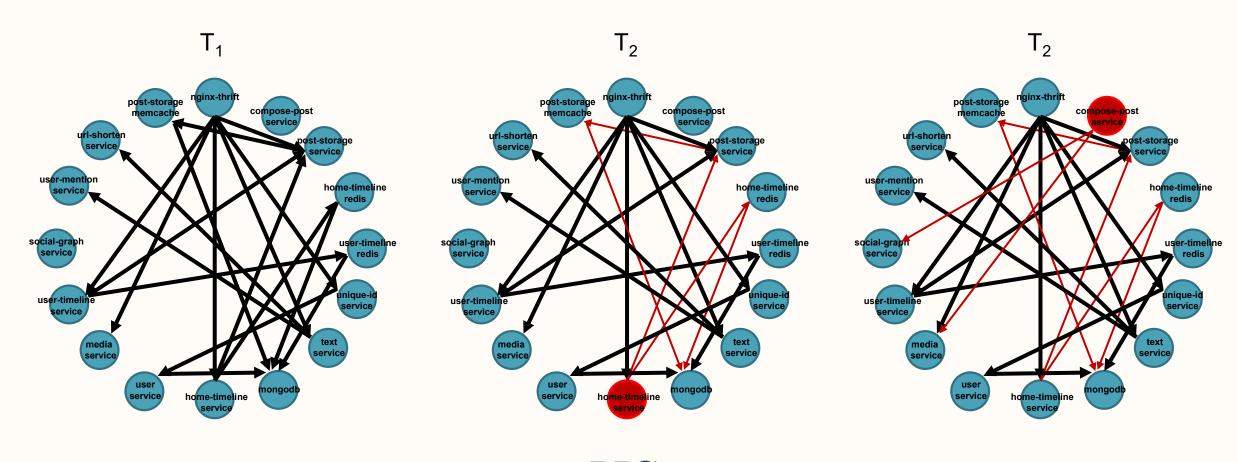
Simulating Fault Behaviour

Tracking Fault Behaviour

Simulating Multiple Faults

Tracking Multiple Faults