Geo-aware State Deployment Problem for Mobile Distributed Applications

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Research Area: Distributed Systems

Work Plan

1. Problem:
   - Geographical barrier between end users and Cloud servers storing state of mobile applications.
2. Why is it a problem?
   - Resulting latency and jitter negatively impact application performance.
3. How to address the problem?
   - Develop a self-configuring geographical-aware distributed system based on Fog Computing, to deploy application state at the most convenient location.
4. Consequences:
   - This framework will effectively contribute to reduce:
     - Latency in access to data
     - Network traffic
     - Server storage load

Fog Computing

- Proposes approximation between servers and end users
  - Surrogate servers at network edge
- Can mitigate latency & jitter, improve performance
- **Benefits depend** on correctly deploying each state component at its most convenient location**!**

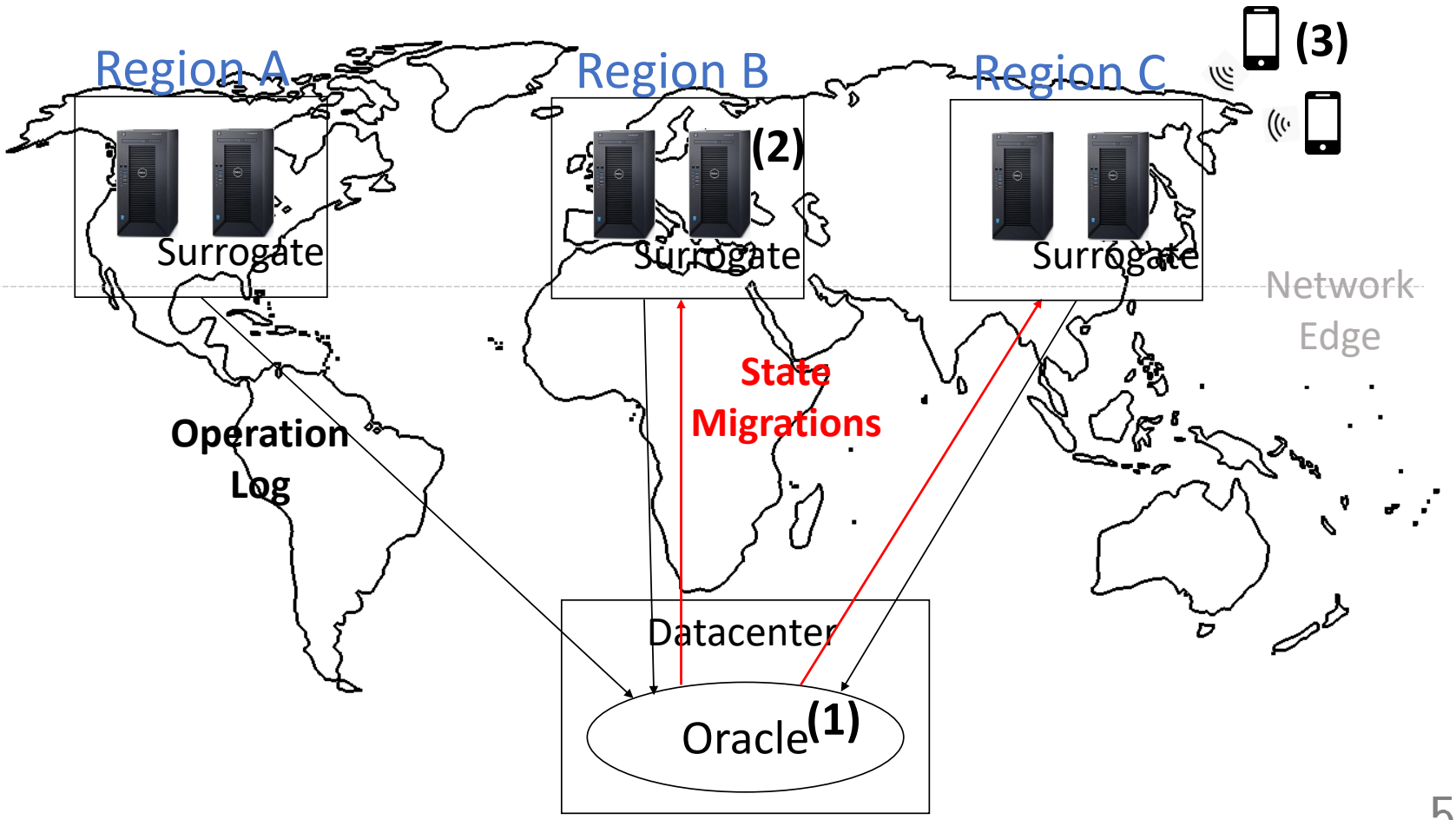
System Model 1/2

- Application state is composed by:
  - Personal data → data unique to each user
  - Geo-dependent data → collaborative data relevant to a specific geographical location
  - Global data → general application logic data

- Application operations:
  - Local operations → involving data stored in a **single** location
  - Global operations → involving data stored in **multiple** locations
    - Need coordination among the different locations to guarantee consistency

System Model 2/2

- *Surrogates* = servers deployed at the network edge
- Serve as entry points to clients connecting to the application
- Store state and provide computing power



So far...

Objective:

- Successfully identify and adapt to state utilization patterns for **Personal** and **Geo-dependent** data
- Decide the most convenient surrogate to store each state item

- We proposed a graph-based approach:
  - Inspired on database partition so that most transactions only access one partition
  - Identify data correlations

What is ahead?

From System Model:

- Application state is composed of: Personal data, Geo-dependent data, Global data
- Geo-aware State Deployment aims at solving first two

What about Global data?

- How to define what is Global data?
- Where should it be stored?
  - Surrogates at the edge?
  - Oracle in background datacentar?
- Protocol definition

Real life implementation on Cloud infrastructure

End

THANK YOU!