Geo-aware State Deployment Problem for Mobile Distributed Applications

Diogo Lima

Advisor: Hugo Miranda
LaSIGE, Faculdade de Ciências, Universidade de Lisboa

PhD Stage: Planner
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!
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
Surrogates = servers deployed at the network edge
Serve as entry points to clients connecting to the application
Store state and provide computing power
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 datacenter?
- Protocol definition

Real life implementation on Cloud infrastructure
THANK YOU!