A Design of Failure Injection Testing considering Edge Computing Environment

Kenta Hayashi†, Kaori Maeda†, Tohru Kondo‡
† Graduate School of Information Sciences, Hiroshima City University, Japan.
‡ Information Media Center, Hiroshima University, Japan.

Background

• The current cloud services composed by many distributed micro services[1]
• High complexity of collaboration of micro services
• Requirement for availability and capability without service disruption
• Emerging of Chaos Engineering[2] to improve for resilience of complex distributed systems
• Demand of edge computing for IoT
• Long latency or unstable connections in an edge computing environment have many negative effects on IoT applications
• Edge computing environments including IoT devices have different failure occurrence rates depending on places

The goal of this research

Implementation of a Failure Injection Testing (FIT) system for edge computing environment

• Design of a failure injection scenario which is friendly to application providers
• Implementation of the FIT system based on an arbitrary scenario such as power failure into 50% of edge servers

Design of failure injection testing system

Failure injection scenario

• Indicates structured scenarios for the edge computing environment including the following items
  • Failure injection range (ex. edge side server, access network)
  • Type of failure (ex. packet loss, jitter)
  • Probability of failure occurrence (ex. 50%)
  • Failure injection period (ex. 10 minutes)

Future prospects

• Demonstration of the effectiveness of the developed FIT

Reference


This research and development work was supported by the JSPS KAKENHI Grant Number 15K00130, 16H02808, 18K11266 and MIC/SCOPE #162108102.