Tongo: A Framework for Supporting Mobile Application Architectures

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• Motivation
• Tongo
• TongoMobile
• Experimentation and Results
• Conclusions
The Neonate Care Support Application

- When a newborn arrives the first minutes are really important

- General doctors need to conduct specific tests to find out if the baby comes with a complication
  - i.e. Cardiology Problems

- Sometimes general doctors need to request clinical advice from greater complexity centers
  - They are located in hard to reach places or rural areas
A Level 1 doctor interacts remotely with an specialist answering the emergency

- Depending on the diagnostic, the emergency must be routed to a high level doctor in a transparent way
- The application must dynamically adapt itself to provide medical services of growing complexity
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Context

– Framework for developing and executing Service-Oriented Applications

– Developed at Los Andes University (2004)

Main Elements

– *TongoService*
  
  • XML Interface Definition
  
  • Java Class implementation (multiple)

– *TongoApplication*: Set of related *TongoServices*

Main Advantage

– The capacity of changing the implementation (self-adaptation) of *TongoServices* at runtime
TONGO ARCHITECTURE

- TongoService (Framework)
- TongoAdmin (Services Lifecycle Management)
- TongoKernel
- Application Server

- TongoService (User)
- TongoService (User)
1. Domain-Specific Language TongoDAL

2. Modifies Service’s Behaviour

Adaptation Rules

TongoDA (Load / Unload Adaptations)

TongoService (User)

TongoService (User)

TongoAdmin

TongoKernel
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**EXPERIMENTATION AND RESULTS**

- **Experimentation Scenario**
  - Simon Bolivar Hospital – Bogotá
    - Three level 1 medical centers - Located at the outskirts of the city
    - One specialist of each level (2, 3, and 4) geographically distributed
  - TongoService: NeonatologistService
  - Four different adaptation rules
  - Simulated conditions
EXPERIMENTATION AND RESULTS

scenario serviceLevelAdaptation
with params incomingForm
adaptation serviceLevelAdaptation
when invoe-method in neonatologistService
on consultingSpecialistRegister
read as follows
...
endread
before apply rule switchLevelOfService3;
before apply rule switchLevelOfService4;
endadaptation
endscenario

rule switchLevelOfService3
on categoryOfService == 3
and actualImpl == "neonatos.neonatologist_n2"
do operation replaceIntances (serviceName, implN_3);
endrule

TongoDAL
EXPERIMENTATION AND RESULTS

- We are testing the architecture in a different context
  - Chronic Headache Characterization
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• During the experimentation phase the dynamic service swapping goes unnoticed to the mobile applications
• The physicians involved had a general feeling of satisfaction
However ....
• We need to consider legal and cultural boundaries
• Communication across mobile networks is prone to congestion and high latency
• We are designing a more usable interface (Mobile Application)
Thank you

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