Binary Context Tree Based Middleware for Next Generation Context Aware Networks

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Abstract

In this project, we present our

- **Context aware mobile application management system architecture** in sample **Smart Workplace Scenario.**

With our proposed,

- **Middleware**
- **Modelling technique** *(Binary Context Tree)*
- **Reasoning technique** *(Formal Language Based Logic Rules)*

Introduction

- *Context* is any kind of information that is collected from environment with special functionalities as **acquisition**, **modelling**, **reasoning** and **distribution**.
- These functionalities are executed by *Middleware* as abstract layer.
- If this obtained context data used by systems then, these systems are called as *Context Aware Systems.*

-Intelligent & special systems

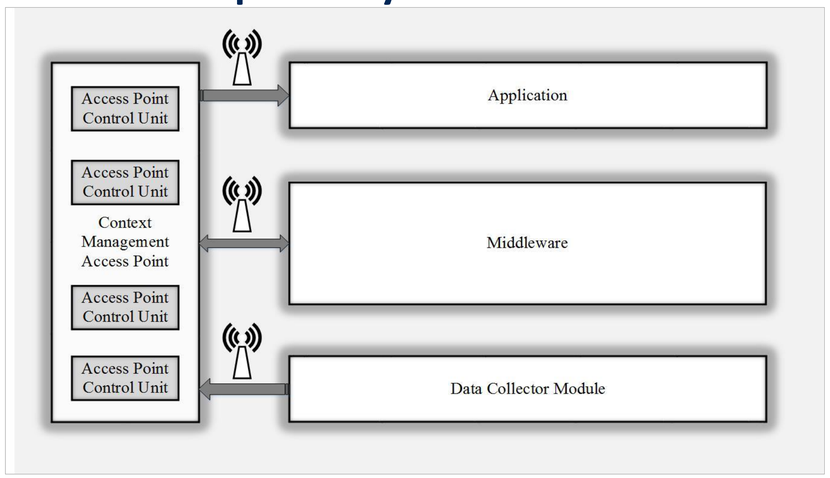
Challenges

- Modelling method must be *simple* & *fast* & *well-structured* & *flexible.*
- Reasoning method must be *structured* & *standard* & *reusable*.
- Current methods *do not* enable all of these requirements at the *same time.*

Contributions

- To solve above challenges, we propose
  - *Priority Based Binary Context Tree* as modelling technique.
  - *Formal Language Based Logic Rules* as reasoning .technique.
  - Context Tuple as *C= < Existence, Location, Activity >* for smart workplace scenario.

The Proposed System Architecture



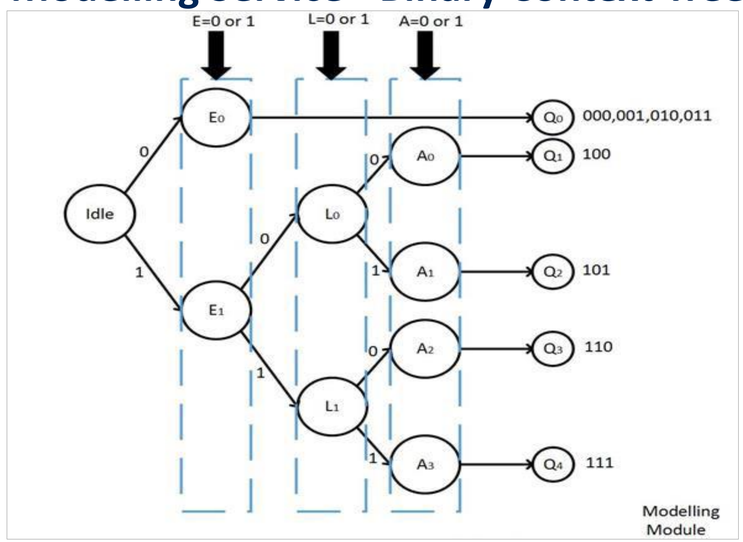
Components:

- Two type sensor(signal & location) in Data Collector Module
- Context Aware Application
- Wireless Networks
- The Proposed Middleware
- Distributed Access Point Control Units

Benefits:

- Extendable
- Scalable
- Fast

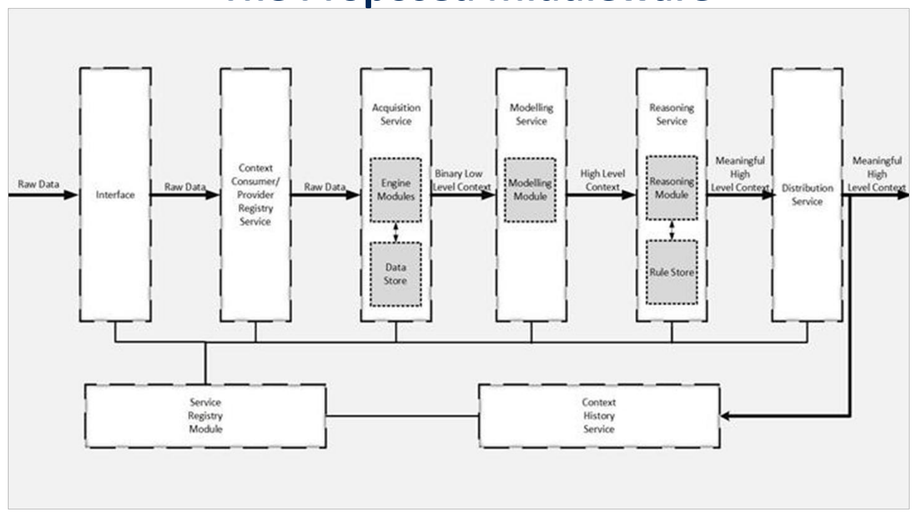
Modelling Service - Binary Context Tree



Benefits:

- Priority Based
- Simple
- Extendable
- Fast
- Quality Checking
- Well-structured

The Proposed Middleware



Components:

- Interface
- Context Consumer/Provider Registry Service
- Service Registry Module
- Context History Service
- Acquisition Service
- Modelling Service
- Reasoning Service
- Distribution Service

Benefits:

- Flexible structure
- High level abstraction
- Service Based

Reasoning Service-Formal Language Based Logic Rules

Context	<E, L, A> 3- tuples
Alphabets	E, L, A, E*, L*, A*
Grammer Rules	1: E, L, A & 0: E*, L*, A*
Words	EL*A* E*L*A* EL*A E*L*A ELA* E*LA* ELA E*LA
Logic Rules	E*L*A*, E*L*A,E*LA*, E*LA || E* = Disconnect State (Not Available) EL*A* = Employee is not in his own room and not working EL*A = Employee is not in his own room and working ELA* = Employee is in his own room and not working ELA = Employee is in his own room and working

Logic rules with

- Alphabets
- Grammar rules
- Words

Benefits:

- Reusable
- Structured
- Formal
- Standard

References

- C. Perera, A. Zaslavsky, P. Christen, and D. Georgakopoulos, "Context Aware Computing for The Internet of Things: A Survey," IEEE Communications Surveys & Tutorials,, pp. 414–454, 2014
- D. Garlan, D. P. Siewiorek, A. Smailagic, and P. Steenkiste, "Project Aura: Toward Distraction-Free Pervasive Computing," IEEE, Pervasive Computing, vol. 1, no. 2, pp. 22–31, 2002.