Effective Cloud-Based Context Modeling for Mobile Devices

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Abstract

Because of the proliferation of mobile devices like smartphones and the emergence of the Cloud Computing ecosystem, mobile Cloud Computing has emerged as a new IT model. Users can access a wide range of services and information technology (IT) tools in this mobile cloud setting, so it's crucial that these are managed efficiently. Hence,This article develops an ontology-based context model for mobile cloud computing, with the goal of furnishing users with contextually relevant dispersed information technology tools and services. This article proposes a context model that makes use of context-aware information in order to better handle dispersed IT resources and deliver highly precise customized services.

Main text

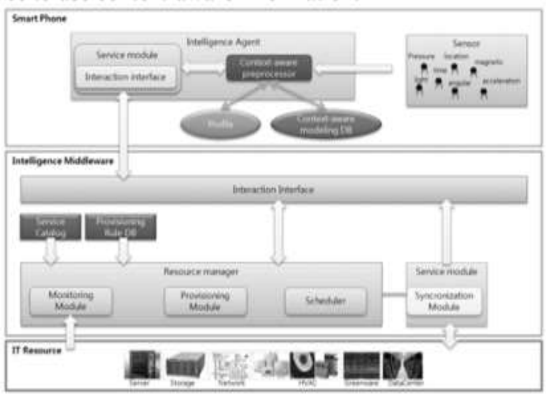
The smartphone industry has been expanding quickly as of late, and cloud computing is following suit. Because of this, mobile cloud computing is emerging as a topic of discussion today. Cloud computing is a model of remote data storage and processing that makes use of the Internet to host a network of virtual servers. During a cloudy spell IT resource (including software, storage, a computer, and a network) are lent to users on an as-needed basis; users then make use of these resources while paying only for the time they actually use them. With cloud computing, you can access your data from any mobile device, anywhere in the world, independent of the type of device you use. Personal data stored on mobile devices in a mobile setting can be used to facilitate the collection of a wide range of context-aware data. There has been a rise in the desire for individualized services. Therefore, research into context-aware reasoning techniques has been conducted to better tailor services to individual users in a mobile setting[2-9]. A explicit context model must be made available in this context-aware system in order to supply the data required by applications, as well as to keep and handle context. The research on context-aware mobile services in mobile platforms is still lacking, however, as the paradigm cannot be extended to mobile platforms due to the restricted resources of mobile devices. Smartphones are at the centre of the current buzz surrounding mobile cloud. While research is active in areas like connecting smartphones to personal virtual systems in the cloud and making unlimited use of computing resources, research into how to effectively manage distributed IT resources and provide intelligent mobile service through reasoning based on collected information and the role of the mobile device as a medium for context collection has been largely neglected. Therefore, this paper designs a context model based on ontology in mobile cloud computing and develops in order to the optimized mobile cloud service by recognizing the conditions of user and cloud server and reasoning on the basis of external context achieved from mobile or internal user's personal information and information of resources from cloud server and service use information.

Related Works

The term "mobile platform" is commonly used to refer to mobile software, which allows users to access mobile-optimized content or services through a standardized interface built on top of Real-Time Operating Systems (RTOS) and hardware capabilities. Windows Mobile, the iPhone, Android, Symbian, etc. are just a few examples. this movable infrastructure. Key-value modelling, markup scheme modelling, graphical modelling, object oriented modelling, and ontology based modelling are all examples of context-aware information modelling methods used in the current pervasive and Web-based settings. Recent research has focused on the ontology model, a context-aware framework that facilitates the expression of ideas and relationships. There has been a recent push to adopt ontology-based models in a wide range of context-aware frameworks, and ontology models have been explored actively in relation to Semantic Web research based on OWL (Web Ontology Language). Ozturk and Aamodt suggested the use of taxonomy in context modelling, which was an early approach. When researching ontologies, Van Heist separated them into two categories: Structure Type and Concept Issues. Knowledge models, information vocabularies, and specialized dictionaries are all examples of ontologies that can be categorized by their structure. Domain ontology, application ontology, representation ontology, and generic ontology are the four subcategories of concept problems that can be found in [10]. In order to describe various types of context, Guarino categorized ontologies based on their broad level [11]. Space, time, substance, object, event, and action are just some of the high-level ideas that can be described by ontologies. Both topic Ontologies and Task Ontologies specialize the words introduced in the Top-level Ontology to define the language specific to a broad topic or task or action. Specializations of the linked taxonomy, Application Ontologies define ideas that are relevant to a given area and job. These ideas represent the functions that subject actors play when carrying out a given task. In order to represent context correctly, context awareness needs to first obtain context. Next, modelling is required to make use of the gained information. The specific sort of context model has been used in a wide variety of tasks. After collecting raw data and converting it into a form that an application can comprehend, the Context Toolkit[12] recommends a series of intermediary levels to transmit the data to the application. Hofer discovered hydrogen [13]. The structure of this mechanism is tiered. The model's ability to depict a computing environment in which IT resources are distributed and allocated in response to user requests is impressive; consequently, research into technology for managing and successfully dealing with such resources is warranted[1]. The supremacy and economics of cloud computing meet the portability and ease of mobile to produce a synergistic effect that opens up new opportunities for the IT industry through mobile cloud computing. The term "mobile cloud computing" is used to describe a system where data is stored and processed using an object-oriented approach. However, there is a gap in the representational precision. The object-oriented methodology is the foundation of Karen's context information paradigm. Some of the qualities of context information, such as its permanence and other time traits, quality, and interdependencies, can be represented and reasoned about formally thanks to this modelling concept[14]. He tried to represent with UML's class diagrams and the Entity-Relationship model. The Context-conscious Sub-Structure (CASS)[15] is a middleware-based system for developing mobile applications that are conscious of their surroundings. This software is able to deduce context without requiring a recompile thanks to its separation of application and context inference. Upper Domain and granular Sub Domain make up CONON (the Context Ontology)[16]. The context model is built on top of a hierarchy of generic classes, each of which describes a different type of real or mental entity. These classes include Person, Activity, Computational Entity, and Location. This paradigm can be expanded to include new domain-specific ideas. However, it's challenging to depict varied context with higher context limited judiciously, and logic reasoning is supported for checking the coherence of context information and reasoning over low-level. However, on mobile cloud computing, these context models are inadequate. For this reason, the authors of this article suggest a context model for describing context-aware information in mobile platforms and for better resource management based on the individual's context.

System Architecture

In this paper, we suggested context-aware-based intelligence mobile cloud service platform for efficiently managing resource to use context-aware information.



As shown figure 1, suggested system consisted of intelligence agent and intelligence middleware. Intelligence agent was responsible for understanding a variety of context-aware information and inferring it. And it consisted of sub-modules such as service module, context-aware pre-processor, personal profile, context-aware information modelling database. Intelligence middleware was responsible for providing services and efficiently managing IT resources by user's request on mobile cloud computing. Context-aware pre-processor on intelligence agent included process for collecting context-aware information and modelling it, inferring context-aware information, and responsible for understanding what user's situation was. Service module was responsible for sending context-aware information to intelligence middleware, providing services that suitable to user. Personal profile was repository which was stored personal information, such as service information by using user, user's ID, password. Context-aware modelling database was stored to information which was modelled by using ontology. Intelligence middleware consisted of interaction interface for communicating to agent, resource manager, service manager, Service catalo, Provisioning Rule Database. Resource manager responsiblefor effectively allocating and managing service information was required for processing user's request service, and consisted of monitoring module, provisioning module, and scheduler. Monitoring module crawled information of IT resource utilization. Provisioning module set up plan for providing best service to analyse context-aware information which

Wastransferred by user and utilization information of IT resource. Scheduler was scheduled to utilization of service and resource by plan which was established to provisioning module. Service Catalo was stored service information for which user used, provisioning rule database was stored rule for providing best provisioning process to use context-aware information and utilization of resource. Also, service module was responsible for executing service and using distributed IT resource to providing service to user, and consisted of sub-module, such that synchronization module. Synchronization module responsible for synchronizing resource which user was using on cloud computing.

Classification of Context Model

In mobile cloud computing, context-aware information which can be used is user's profile, services that user was used, resources for providing services. And we need to provisioning techniques to manage resources more effectively on mobile cloud computing, multimodal techniques for supporting. convenient user's interface, inferring user's intention more accurately. So, we include entity such as provision, activity. Figure 2 shows each entity and relational property.

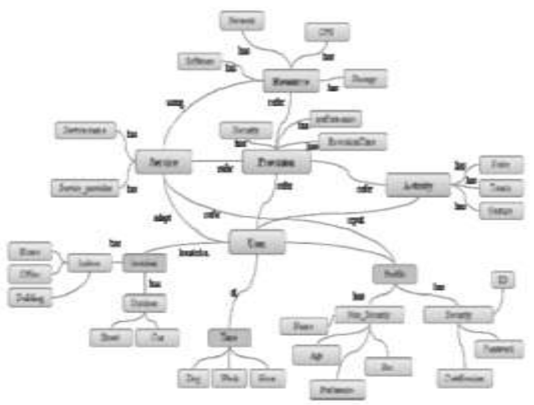


Fig.2 Context model Suggested platform architecture.

In this paper, generic ontology is user, service, resource, provision, activity. And they are connected with each other through relational property(e.g.Located in between User and location). Individual generic ontology includes domain ontology as a detailed material and immaterial entity (egg, User, and location). Consequently, it provides extensibility and formal representation ability by hierarchical ontology classification.

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 </owl:DatatypeProperty>
 <owl:DatatypeProperty rdf:about="#time">
   <rdfs:domain rdf:resource="#User"/>
   <rdfs:range rdf:resource="&xsd;string"/>

 </owl:DatatypeProperty>
 <owl:DatatypeProperty rdf:about="#Profile">
   <rdfs:domain rdf:resource="#User"/>
<rdfs:range rdf:resource="&xsd;string"/>
 </owl:DatatypeProperty>

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    <rdfs:domain rdf:resource="#Resource"/>
  <rdfs:range rdf:resource="&xsd;string"/>
</owl:DatatypeProperty>
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  <rdfs:domain rdf:resource="#Resource"/>
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     <rdfs:range rdf:resource="&xsd;string"/>
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  ////////////////////// Classes ////////////////////////////
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      <rdfs:subClassOf rdf:resource="&owl;Thing"/>
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////////////////////// Classes ///////////////////////////
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Conclusions

Gathering contextual information is the starting point for any model. After information has been gathered, it can be put to better use if it is organized. In this piece, we propose a framework for tailoring service delivery and resource optimization to each individual user's context. Computing on the go with online storage. Several new terms for characterizing the environments of models have been developed by us as well. A tree illustration depicting our theory hierarchy. In order to tailor user encounters and efficiently manage IT resources in a Mobile Cloud environment, a context model is proposed in this paper. New inferential skills are a major emphasis of our upcoming research. After the suggested platform has been implemented, we will evaluate and analyse its performance, as well as investigate the resource management strategy that effectively regulates geographically distributed IT assets by means of external data.

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