

A Development of a Sales Log System for IPTV Systems

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Abstract

This paper introduces our development of a sales log system for IPTV systems. This log system records all events related to sales including registration of content, distribution contracts, customers' accesses to content, and payments. Billing is one of essential activities of any commercial organization. Our log system provides all necessary information for billing. Sales history and sales amount of each content item, of each content provider and of each distributor can be retrieved from our log system. Retrieved information can be exported to an Excel spreadsheet. One of the distinct features of our system is that it is system independent in that any IPTV system can use our log system via the Web services our log system provides.

Keywords: IPTV, Billing, Log, Charging, VOD

1 Introduction

Recent evolution in the technology have made it possible to deliver digital television services over fixed and mobile broadband network, which is commonly known as IPTV. IPTV is a system in which digital television services are provided using internet protocol over a network. IPTV has unique features in addition to simply broadcasting ordinary TV programs over the Internet. Its key features include [5]: Video on demand, Interactivity, Convergence, and Some more features.

Making use of these diverse services, IPTV service providers launch various sales plans in order to attract more customers. As the sales plans get diversified the billing system also gets complicated. This paper introduces a sales log system that records all events related to billing including registration of content, distribution contracts, customers' accesses to content, and payments.

2 Related works

The authors of [9] introduced a flexible product management system that is developed in modules. Similar sales plans can be packaged by the same module with different parameter assignment. The regular production packaging can be classified into the regular product sales and seasonal promotions.

An IPTV customer can enjoy the following services: broadcast service, short message system service, messenger service, videophone service, VOD, E-commerce, Internet banking, and Web service. The authors of [3] developed an architecture of billing model for IPTV.

The IP Multimeida Subsystem or IP Multimedia Core Network Subsystem (IMS) is an architectural framework for delivering IP multimedia services [10]. The authors of [4] explored the design of a user friendly efficient charging, billing and accounting (CBA) system for IMS networks. The IMS services that the CBA system handles include Voice over IP (VoIP) and IPTV.

Delivery of IPTV services on IMS networks involves subscribers requesting media channels from an IPTV application server. Charging for the IPTV content can be achieved using content charging mechanisms. This may involve the use of a once-off charging fee for VOD services; the once-off fee may have a validity period especially when dealing with broadcast services. Standardized event based charging mechanisms would be suitable for VOD charging [4].

VOD is one of the most popular services that IPTV systems provide. The authors of [8] introduced their design and implementation of a VOD database system. One of the key success factors of IPTV services is the quality of service, and one of the main aspects of quality is timeliness. The authors of [7] introduced a fast algorithm for IPTV system response time analysis. Service Level Agreements (SLA) specify the quality levels customers expect during service provisioning [1]. The authors of [1] proposed a protocol for secure mobile IPTV service delegation to support SLAs. The authors of [6] proposed channel domain system that logical-

ly extends channel allocation capability over limited channel resources. The authors of [2] proposed a handover scheme over standard Mobile IPv6 that provide good quality of service.

3 Design and Implementation of a Sales Log System

Our sales log system records purchasing events and consuming events triggered by distributors and end users. Since the goods are mainly multimedia contents and they are registered through the registration system our log system has to communicate with the registration system as shown in Figure 1. Content providers register their multimedia content such as video, movie and animation to the IPTV system through the content registration system. The content registration system allows the distribution hub system access the metadata that is information about the content. The distribution hub displays a list of contents so that distributors can select and issue purchasing order for particular content. End users access content through distributor's front ends. A smartphone app, an internet portal and IPTV channel can be examples of distributor's front ends. Through front ends, end users purchase content and make payments. The distribution hub system informs the sales log system of all events related to content transaction including order, purchase and payment. The sales log system creates and saves the transaction information into the sales log database.

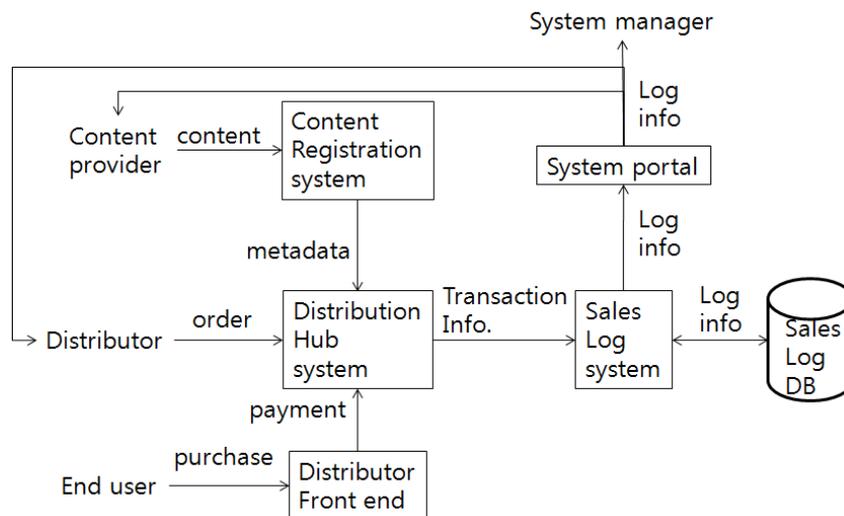


Figure 1. A context diagram for the sales log system

System managers, content providers and distributors can retrieve log information through the system portal site. For each content item, the content provider who registered it can retrieve various statistical information. The number of accesses and the number of purchase orders made for the given period of time, the most frequently accessed time of the day, day of the week, and month of the

year, the number of accesses for each gender type, the number of accesses for each age range, and so on are examples of statistical information. These various statistical information of a content item is available to a distributor who purchased it. System managers can retrieve all sales information about all content items.

Our sales log system records all sales related events in the database system. When a distributor made an order, this event is recorded in DistributionInfoTable. Important attributes of this table include: JobType, DistributionID, ContentID, DistributorID, ContentProviderID, GenreID, OrderSheetID, RunningTime, DeploymentType, RegistrationTime, and OccurrenceTime. A typical query sentence to insert a record to this table is as follows:

```
insert into DistributionInfoTable (SeqNo, SystemID, JobType,
DistributionID, ContentID, DistributorID, ContentProviderID, GenreID,
OrderSheetID, RunningTime, DeploymentType, RegistrationTime, and
OccurrenceTime)
```

value

```
(10, '11111', '10', 'CUSAWaBr00KORHULU001185846481',
'CUSAWaBr00FRIENDS35', 'CKORHULU00', 'CUSAWaBr00', '100',
'CKORHULU20140201000', 2400, '02', '2014-02-27', '2014-02-01')
```

JobType can be 10/20/30 representing registration/modification/deletion. DistributionID is a unique identification representing this event. The time obtained by time() function is included in a DistributionID. DeploymentType could be 01/02/03 representing file/URL/both.

A typical query sentence to retrieve recorded information from this table is as follows:

```
select * from DistributionInfoTable
where DistributionID = 'CUSAWaBr00KORHULU001185846481'
order by SeqNo limit 10, 20
```

Considering the attributes of DistributionInfoTable, we can infer that tables to record information of content, content providers, content distributors, genres, and so on. Information of content is recorded in ContentInfoTable. ContentID, ContentName, ProviderID, GenreID, RunningTime, RegistrationTime and UpdateTime are example attributes of this table.

As is distribution information is recorded in DistributionInfoTable, information of payment is recorded in PaymentInfoTable. The attributes of this table include PaymentID, ProductID, MemberID, PaymentAmount, PaymentTime, CancelYN, CancelAmount, CancelTime and DistributorID.

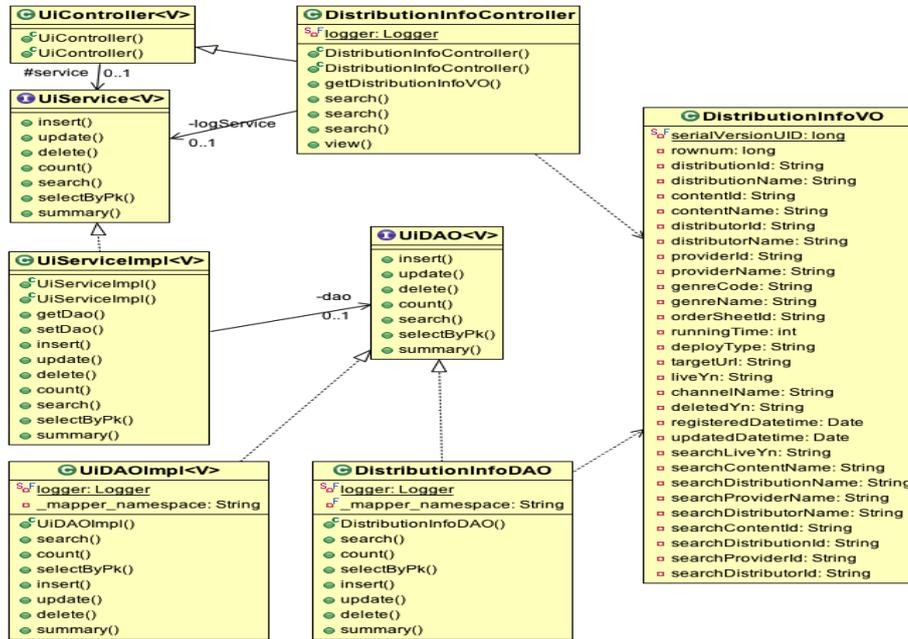


Figure 2. Java classes for retrieving distribution information

Information of user's access to the content is necessary for billing. The information includes the user identity, the content accessed and the actions the user performed on the content. This information is recorded in ControlLogTable. The attributes of this table include DistributionID, DistributionType, DeviceID, DeviceIP, CountryID, LanguageID, ProductID, MemberID, PaymentID, ControlType, StartTime, EndTime, and ProcessNo. ProcessNo represents the billing process that accounts for this access. This implies that we have another table where information of billing process is recorded. This table is defined as BasisProcessTable. Meaning of each of the other attribute is self-explanatory.

We have implemented Java classes shown in Figure 2 for distribution information retrieval. Following MVC (Model View Controller) pattern, model, or data that is to be visually represented is defined in DistributionInfoVO, code to manage input to the model is defined in DistributionInfoController and there is a view for visual representation of the data. In the similar manner (MVC), we have implemented Java classes for payment, unit billing, daily billing, monthly billing for content providers, and so on.

4 Conclusions

Billing is one of the most important activities for any IPTV operators. We have implemented sales log system for IPTV billing systems and performed experiments of testing the system. Our test results showed that the log system

keeps track of every distribution, consumption, and payment. Our test results also showed that the system produces sales total of each content item for each content distributor and content provider with the recorded information.

Our sales log system provides Web services that insert, update and delete distribution, consumption and payment events. Any IPTV system can use our log system by invoking these Web services. Therefore, we can claim that our log system is system independent.

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