Computer Engineering and Intelligent Systems
ISSN 2222-1719 (Paper) ISSN 2222-2863 (Online)
Vol.5, No.12, 2014

Object-Oriented Modeling of DIPRM System for E-Commerce Transaction

Sanjay Banerjee* Sunil Karforma
Department of Computer Science, University of Burdwan,PO - Rajbati, Burdwan - 713104, WB, India
E-mail: sanjay.banerjee@yahoo.co.in, sunilkarforma@yahoo.co.in

Abstract
The ease of creation, modification, distribution, compatibility and above all, a large market opportunity drive the creator and the consumer to move towards the digital age to create and use their IP digitally called Digital Intellectual Property (DIP). But the DIP infringements in E-commerce drives us to design a unified generic model that can manage Digital Intellectual Property involving rules, regulations, practices, business models etc. In this scenario an attempt has been made here to design a well-structured prototype that brings all components of the E-commerce system into a common platform with a view to offer a model of a unified integrated ecommerce system. We have tried a maiden attempt to use UML to design the model of such system, which is the recent trend of software engineering practice. This allows developing a very flexible model that facilitates maintainability, reusability, portability and other Object Oriented features inherent in the new E-commerce scenario.
Keywords: DIPRM, DRM, E-commerce, UML, OOM

1. Introduction

Intellectual property, often known as IP, allows people to own their creativity and innovation in the same way as someone owns physical property. The owner of IP can control its use, and this encourages further innovation and creativity to benefit the consumer in the E-commerce environment. The latest digital age encourages the creator and the consumer of the IP to produce and consume their IP digitally, known as Digital Intellectual Property (DIP).

The information age has both the advantage and the disadvantage to the DIP creators and the DIP consumers. Also, Internet makes it possible to circulate the DIP anywhere in the world in a very small amount of time. This is boon to the DIP creator and the DIP consumer. Nowadays, a PC can turn to a library of DIP and can be accessed from anywhere of the world. In one side this facilitates the DIP creator to make the whole world as their market and consequently can increase the sales opportunity. But in the other side this invites increased threat to them. The ease of coping, modifying, circulating etc. of the digital product becomes the nightmare to them. For instance, a creator creates a DIP and over Internet it is bought by a consumer, which means that the consumer buys the single user license. But afterward, the DIP can be copied in multiples using the latest cloning software and can be circulated throughout the world within a small amount of time. This practice undoubtedly violates the copyright act. As in the traditional mode of transaction the chances of such violation is almost absent, this mode of transaction has therefore, encouraged by the trusted system transaction. This discourages the creator of DIP to participate in E-commerce transaction system. In view of this disadvantage of the current E-commerce transaction model, an attempt in this paper is made to reengineer it so that the newly proposed model can be used safely to transact DIP also.

2. Objective of the present study

Our proposed DIP management model, DIPRM seeks not only to look after the digital transaction over the E-commerce system but also to manage and distribute the right of the DIP. Hence, the proposed DIPRM model has been designed to make good of the functional deficiency of the current DIP transaction by means of ensuring the management of Intellectual Property Right (IPR) over the E-commerce system. The major difference between our proposed rights management system and other existing rights management systems is that our system operates in the E-commerce domain, which could be a trend and standard for many online business and trading services. The objective of this research paper is to provide a rights management system serving most of the electronic commerce and services over the Internet.

DIPRM is designed as a prototype model using different diagrams of UML that enables one to create, deliver, protect rights and enhance the DIP in the E-commerce system. This model consists of business standards, frameworks and technologies that establish trust in E-commerce based DIP transaction system. Nowadays OOM of software engineering is gaining popularity for development of high quality and secure software. In order to achieve those features in our proposed model, we have wrapped DIPRM in object-oriented model.

3. Methodology

The more complex is a system, is the more the value in modeling it. This is because modeling is, primarily, an

abstraction mechanism. It allows us to remove or hide superfluous details and reduces a system to a more readily understandable generic form.

The Unified Modeling Language (UML) is a generic prototype design technology which facilitates graphically visualizing, specifying, constructing, and documenting a system's blueprints.

UML consists of a number of graphical elements that combine to form diagram. The purpose of the diagrams is to present multiple views of a system, and this set of multiple views is called a model. UML model describes what a system is supposed to do. It doesn't tell how to implement the system. UML includes nine diagrams namely Class diagram, Object diagram, Use Case diagram, Sequence diagram, Collaboration diagram, Statechart diagram, Activity diagram, Component diagram, and Deployment diagram which help to designs a system.

To model our proposed system we consider Class diagram, Component diagram, Deployment diagram, Use Case diagram, Sequence diagram, Collaboration diagram and Activity diagram of UML.

Class diagram helps to figure out the objects along with the property and functions of those objects, Component diagrams describe the organization of physical software components, Deployment diagram depicts the physical resources of the system, Use Case diagrams are used to document system requirements, which also helps us to clarify exactly what the system is supposed to do. Sequence diagram describes interactions among classes in terms of an exchange of messages over time; Collaboration diagram represents interactions between objects as a series of sequenced messages. It also describes both the static structure and the dynamic behavior of a system.

3.1. Identification of Objects

To model the proposed DIPRM system we require identifying the objects internally or externally related with the system. The objects and their tasks in designing a prototype system for DIPRM are described below:

Creator: Creator is the person who is the actual owner of the copyright work. We have identified the following functions performed by a Creator class also illustrated in Figure 1.

- *CreateDIP():* This function is used to create a DIP
- *ModifyDIP():* This is used to modify a DIP
- *DestroyDIP():* To destroy a DIP this function is used and
- *CollectRoyalty():* Is used to collect royalty.

The functions along with the data member of Creator are wrapped into a package called class. The class facilitates different latest software engineering features, such as, data hiding, inheritance, polymorphism, data abstraction, encapsulation etc. Figure 1 shows class Creator.

Right Holder (RH): Right Holder may be a person or organization, performing the same task as the task performs by the creator. In OOP such type of consideration is refer to as generalization. Figure 2 shows the diagrammatic representation of Right Holder.

Information/Content Provider: As like Right Holder, Information/Content Provider is a Person or organization who performs the following operations which we have mentioned in Figure 3.

- *CollectDIP():* Collects the DIP from the Creator or the RH along with all other information about DIP.
- *RegisterDIP():* Gets the DIP registered and collects Digital Object Identifier (DOI) number, which can be used to recognize the DIP globally.
- *ProduceMetadata():* Produces metadata which includes the information relating to the right along with other business information.
- *CreateDigitalPackage():* Thereafter, creates Digital Package (DP).

Internet Service Provider (ISP): It is the place where actual transactions take place, i.e. it performs the role of a distributor. The ISP makes a catalog of the DP which is produced by different Creator, the Consumer selects DP from such list and the transaction is settled. The ISP performs the following functions as illustrated in Figure 4:

- *CollectDP():* Collects DP from Content Provider and places it in a web site for sell.
- *RegusterConsumer():* To get the different service offered by the system the user must be registered first, this function is used to registers consumers.
- *ValidateConsumer():* At the time of login or providing different service to the consumer by the system, the validity of the consumer is to be check first, this function perform that task.
- *SearchDP():* Allows the Consumer to search DP from the catalogue database.
- ReceivePayment(): Receives payment through Payment Gateway.
- *GrantDIPDownload():* Allows Consumer to download DP along with the purchase rights.
- *RecordTransaction():* Records all transactions that actually take place for the future reference.

Digital Object Identification Registration Agency (DOI RA): DOI is an Organization [170] where the DIP is registered by the ISP and a unique number is given to identify the DIP globally. Figure 5 illustrates class DOI, which performs -

- *RegisterDP():* DIP is registered through this function to a DOI registration agency
- *GenerateDOINo():* An unique no is generated through this function and
- *DispatchDOINo():* Dispatch the DOI number to the ISP.

Consumer: Consumer is the intended person or any organization for which the DP is created. As illustrated in Figure 6, class Consumer performs the following functions:

- *RegisterInISP():* The consumer registers himself/herself in ISP through this function, where he/she can buy DP.
- *BrowseDP ():* This function enables the consumer to browses/Searches DP in the catalogue of DP provided by the system.
- *MakePayment():* Through this function the consumer is able to makes payment of the DP which he purchased.
- *DownloadDP():* This function enable the consumer to downloads DP and,
- *ExecuteDP():* After downloading the DP, this function executes the DP.

3.2. Class Diagram of DIPRM

The purpose of the class diagram is to shows the static structure of the system being modeled. In an object oriented application, classes have attributes called data member variables, operations called member functions and relationships with other classes. The UML class diagram depicts all these things quite easily. A class icon is simply a rectangle divided into three compartments. The topmost compartment contains the name of the class. The middle compartment contains a list of attributes or data member, and the bottom compartment contains a list of operations or member functions.

Figure 7 illustrates an example of a class diagram of DIP order processing used in our proposed DIPRM system, where different terms used in object-oriented modeling such as, class, association, multiplicity, dependency, generalization and aggregation are indicated using solid arrow line.

To design the diagram first we have identified the participants related to our system such as, Creator, Consumer, DIP, Payment, Order-Item etc., followed by identification of data members and member functions of those participants. Next, we relate those participants using different relationship applicable among participants such as, aggregation, association, inheritance, dependency etc. For example, payment is a generalization of Cash-based, Credit Card-based and Cheque-based payment, which is mentioned in the diagram using inheritance. Clearly, we refer the cardinality of association among participants using multiplicity.

Figure 8 illustrates the class diagram of DIPRM based transaction system in E-commerce; where we represents six classes, Creator, DIP, Content Provider, Internet Service Provider, Consumer and DOI along with their relationship. The solid line of the figure is representing the association among classes. Each class has related data members and member functions. The member functions of each class are already discussed in the previous sub-section. The multiplicity of association of classes indicates the number of instances of one class linked to one instance of the other class is also shown in the Figure 8.

3.3. Component Diagram of DIPRM

Figure 9 illustrates the component diagram of DIPRM based transaction system. It consists of four packages, Creator, Consumer, Distributor and the ISP. Each and every package again consists of different components as required by the package. The ‘Creator’ package contains component, ‘DIP creator’, ‘DIP usage rights generator’ and ‘DIP distributor’. The ‘Distributor’ package contain components ‘DIP encryption’, ‘DIP license generator’ and ‘DIP package creator’. The ‘ISP’ package contains components, ‘Consumer register’, ‘User authenticator’, ‘DIP catalogue generator’, ‘DIP download’, ‘Order processor’, and ‘Payment collector’. The ‘Consumer’ package contains only one component, ‘DIP requests’.

Table 1 provides the description of different packages and their components used in DIPRM based transaction system along with brief information.

3.4. Deployment Diagram of DIPRM

Figure 10 illustrates the deployment diagram of DIPRM system. The client requests the application server for various DIP related services through Hypertext Transfer Protocol (HTTP). The services offered by the system could be, displaying DIP catalogue, ordering DIP, downloading DIP or processing license related issues of DIP. These types of services are offered to the client through the ISP. The ISP is pretty well to handle such kind of services. The business logic related to managing and securing DIP is to some extend handled by the ISP.

The distributor plays the role of a backend database server here, and support different services offered at the front end to the client through the ISP. It also supports different business logic offered by the organization. The distributor stores the DIP as digital package in encrypted form. The legitimate client, requests to download such DIP through ISP, and after checking the client’s legitimacy the ISP communicate with the distributor through Database Connectivity (DBC) and allows the client to download such package. The downloaded

package is not ready to execute at the client end because it does not contain the license which is required to execute the package. The client, hereafter requests the ISP for the license of the specified DIP. Only after paying the requisite amount for such DIP the ISP collects the license from the distributor and sends it to the client and makes a bond with the license and the client device, where the DIP will be execute.

3.5. Use Case Diagram of DIPRM

According to the object that we have identified in Section 3.1 of this paper and their task we subdivide our system into a number of following use cases which are used to wrap our DIPRM based system in OOM.

Use Case 1: Creator/Right Holder (RH) Creates DIP

As in Figure 11 there are five different use cases, these are

- *Creation of DIP:* The creator or the RH creates DIP.
- *Submission of DIP:* The intention of creation of DIP is to sell it in the market along with its license. The Creator/RH hands over the DIP to the Content/Information provider for the rest of the process, i.e. sells the DIP in the market and collect royalty.
- *Modification of DIP:* After submitting the DIP the creator does not remain idle, he/she tries to modify the existing DIP for its further improvement or to make it attractive according to the consumer's demands.
- *Destroying the DIP:* The creator of the DIP can also destroy his/her creation.
- *Collection of Royalty:* Royalty is the ultimate use case for which the DIP is created. It is collected from the Information/Content provider.

Lastly the two arrows of Figure 11 connected with the Creator/RH denote the generalization of the super class Creator/RH can be a Person or an Organization.

Use Case 2: Information/Content Provider Collects DIP

The Figure 12 describes the Information/Content Provider as the actor surrounded by seven use cases, these are:

- *Collection of DIP:* Is the first use case, which is used to collect the DIP from the Creator/RH.
- *Collection of Information about DIP:* This extends the Collect DIP use case. This use case basically collects all other information related to the DIP collected from the Creator/RH.
- *Registration of DIP:* After collecting the DIP and the related information from the Creator/RH this use case registers the DIP to a Digital Object Identifier Registration Agency (DOI RA).
- *Collection of DOI:* The DOI is a unique identifier of the DIP, given by the DOI RA. This use case extends the Register DIP use case.
- *Produce Metadata:* The metadata containing the rights information and the business information is produced thereafter.
- *Creation of Digital Package (DP):* The DIP along with the metadata is bundled together to form a package and makes DIP ready for sell.

Use Case 3: Internet Service Provider Transacts DIP

Figure 13 describes how ISP interacts with the system along with its five use cases

- *Registration of Consumer:* The consumer intends to take part in the selling process of DP is registered first.
- *Validation of Consumer:* This use case extends the previous use case and only validates the consumer intended to enter into the e-commerce DP transaction system.
- *Sell Digital Item:* The DP collected from the Information/Content Provider is selling through this use case. Prior to that consumer browses and selects the DP that is ready for sell.
- *Collection of Payment:* This use case simply collects the payment from the consumer at the end of the transaction cycle.
- *Registration of Transaction:* This use case intends to store all the transaction for future use. For the market analysis such kind of information is very important.

Use Case 5: Consumer's participation in DIP Transaction

Figure 14 describes the Consumer Use Case, where the consumer interacts with the system in nine possible ways.

- *Registration:* The consumer registers himself/herself in an e-commerce system through the ISP to buy DP.
- *Validation of Consumer:* This Use Case basically extends the previous Use Case Register, where the consumer and the data provided by him/her are verified by the system for authentication.
- *Log-in:* The already registered consumer is not required to get registered again. Through this Use Case he/she enters into the system, after providing proper authentication.
- *Search digital Item:* The consumer browses/searches all the digital items stored into the system, and possibly selects item(s) to buy.
- *Make Order:* The consumer makes order of one or more digital item of his/her choice.
- *Track Recent Order:* The consumer tracks all the order he/she has made recently.

- *Cancel Order:* At any moment, the consumer may cancel his/her order that he/she has made recently.
- *Check Out:* After ordering digital item, consumer checks out of the system.
- *Make Payment:* After checking out of the system, the consumer makes payment through the secure Payment Gateway provided by the ISP and various payment options can be offered to the consumer.

Figure 15 illustrates the DIPRM's consumer registration use cases using UML notations. In this the consumer registers himself with the ISP, to enjoy the DIP related services offered by the ISP. The ISP validates the information provided by the consumer and registers the consumer with the system. Hereafter the consumer is able to log in the system through the login use case.

Similarly, Figure 16 illustrates the order processing of DIPRM using UML notations. Here, the consumer browses the catalogue to select DIP of his choice. After selecting the desired DIP, the consumer makes order to the ISP. ISP hereafter processes the order validate consumer authenticity and sends order details to the consumer. Consumer makes payment for the selected DIP and associated rights which he wants to purchase. Now, the DIP is available for download through use case 'download DIP'.

In previous section, we have discussed that, UML contains different diagrams which represent the artifacts of a system. Sequence diagram is one of the important diagrams of UML, through which we represents the communication of different objects within the system over time. The following section illustrated the communication of objects of our system using sequence diagram.

3.6. Sequence Diagram of DIPRM

The Sequence Diagram which describes the time dependent communication through message passing between the objects is illustrated below.

Figure 17 describes how the consumer and the ISP are communicating with each other, where consumer requests for registration to the ISP. In response to the request, ISP collects all the necessary information about the consumer. The ISP then checks the validation of the consumer and, thereafter confirms the consumer about his/her registration. This Sequence diagram is only considered for the new consumer, the existing consumer is entered into the system in a different way.

Sequence Diagram presented in Figure 18 describes how the consumer, ISP and the Content/Information Provider interact with each other to process order request from the consumer. The consumer enters into the system through log-in, followed by the consumer validation by the ISP, which allows consumer to browse the entire digital items. Consumer chooses and makes order of the digital item. ISP offers several payment options to the consumer e.g. Credit Card, E-banking, etc. After successful payment is made the ISP confirms the consumer. The ISP already collects the intended digital item as Digital Package from the Content/Information Provider. On having the DP the ISP allows the consumer to download the digital package along with the rights he/she purchases. At the end the Content/Information Provider collects the royalty from the ISP.

The DIP creation and registration Sequence diagram is presented in Figure 19, where it describes that after creation of the DIP, the creator sends the DIP to the Content/Information Provider (CP). The CP collects all other necessary information about the DIP and the creator. The next step of the CP is to register the DIP to the DOI RA and collect DOI. Thereafter, along with the collected information, CP produces metadata about the DIP. The DIP and metadata is then bundled as a DP and ready for distribution. At last of this sequence the creator collects his royalty from the CP.

After discussing sequence diagram of DIPRM the following section discusses the collaboration diagram of DIPRM system.

3.7. Collaboration Diagram of DIPRM

Figure 20 illustrates the consumer registration collaboration diagram of DIPRM. In this, the ordering of message execution is described by a number which is given along with the messages. The messages along with the number, class initiates the message and a brief description about the message is given in Table 2.

Figure 21 illustrates the collaboration diagram of order processing of DIPRM. In this, consumer, ISP and the content provider (distributor) exchanging messages between each other and the sequence of message execution is shown using the sequence number along with the message. Table 3 describes different participant of the order processing of DIPRM along with the message send to each other with sequence number and brief description of the message.

Figure 22 illustrates the collaboration diagram of DIP creation and registration of DIPRM. The participants of DIP creation and registration are creator also referred to as the right holder, distributor also referred to as content provider the digital object registration organization. Here the main task is, after the creation of DIP it is delivered to the content provider. It is the responsibility of the content provider to register the DIP to a digital object registration organization, so that a unique number is received, which is required to identify the DIP globally.

Table 4 is the description of the message those are passed from object to object in DIP creation and registration collaboration diagram along with sequence number of execution of messages with a brief description.

3.8. Activity Diagram of DIPRM

The activity diagram of DIPRM based E-commerce transaction system is sketched in Figure 23. The diagram shows different action state, flow, branching and synchronization of the system.

In Figure 23, an authorize consumer entered into the system through login. After successful completion of login process, the consumer may browse catalogue, track previous order or request license for already downloaded digital package.

4. Benefits of using DIPRM

The DIPRM is DRM based generic models to transact DIP in E-commerce environment have the following advantages that we have summarized:

- This model may viewed as an abstract design
- Allows us to hide superfluous details
- Reduces the system to a more readily understandable generic form.
- This model consists of business standards, frameworks and technologies that establish trust in E-commerce based DIP transaction system.
- We have used several diagrams of UML to present multiple views of the system and such multiple views may be combined to form our model.

5. Conclusion

Lots of efforts have been done to manage the digital intellectual property rights. Several considerations have been made due to the different digital formats of the Intellectual Property. There is no as such generic solution to model a blueprint of Digital Intellectual Property Right Management System (DIPRMS).

In this paper an attempt is made to provide a generic functional model to fill such deficiency of DIPRMS. In order to do this we first considered those objects that are related to our system may be internal or external, then sketch the association among those and find out the behavior and interactions of such objects with our system. To design the model we have used UML. Use Case diagrams model the functionality of the system using actors and use cases. The Sequence diagram is used to describe interactions among classes in terms of an exchange of messages over time. Lastly Collaboration diagrams are used to make interactions between objects as a series of sequenced messages. Collaboration diagrams describe both the static structure and the dynamic behavior of the proposed E-commerce DIPRMS system. The proposed model has flexibility to reuse and maintain and can be used in future to design DIP in E-Business system.

References

Wordpress: http://www.normancreaney.wordpress.com/information-technology-thelaw/intellectual-property-explianed/

K. Coyle, “The Technology of Rights: Digital Rights Management”, Based on a talk originally given at the Library of Congress, November 19, 2003.

S. Banerjee and S. Karforma, “Protection of DIP using Object Oriented Modeling of DIPRMS in E-Commerce–An Indian Perspective”, Volume 3, Issue 8, IJSER Press, USA, ISSN 2229-5518, Aug. 2012.

S. Banerjee, D. E. Booth, S. Ghosh, S. Mukhopadhyay, “A Prototype Design for Digital Intellectual Property Right Management in E-Commerce - A UML Based Approach”, Journal of the Computer Society of India, Vol. 36 No. 4, pp-46-51, Dec. 2006.

R. S. Pressman, “Software engineering”, McGraw-Hill Science/Engineering/Math, 2009.

L. Mariani, F. Pastore, and M. Pezze, “Dynamic Analysis for Diagnosing Integration Faults”, Software Engineering, IEEE Transactions, No. 4, 2011.

M. Rong, “An Aspect-Oriented Software Architecture Description Language based on Temporal Logic”, Computer Science and Education (ICCSE), 2010 5th International Conference, 2010.

J. Farrell, “An Object-Oriented Approach to Programming Logic and Design”, Course Technology Ptr., 2012.

J. Martin and J. J. Odell, “Object-Oriented Methods”, Prentice Hall, 1997.

Table 1: DIPRM: Description of Packages and Components

Package Name	*Component Name*	*Description*
Creator	*DIP Creator*	Create DIP
	Usage Rights Generator	Generate usage rights of DIP
	DIP Distributor	Prepare and distribute DIP
Distributor	*DIP Encryption*	Encrypt DIP and generate key
	License Distributor/Generator	Generate license of DIP and distribute such license on request
	Digital Packager	Create a digital package, contains encrypted DIP and rights of usage DIP
Internet Service Provider (ISP)	*Consumer Register*	Allow new consumer to register, require for DIP transaction
	User Authenticator	Check the authenticity of the user and allow only the legitimate user to enter into the system
	Catalogue Generator	Prepare catalogue of 'ready to transact' DIP along with the details information of DIP
	DIP Download	Allow to download DIP on request
	Order Processor	Process order of DIP make by the consumer
	Payment Collector	Collect payment from the consumer and distribute the amount into the DIPRM supply chain
Consumer	*DIP Request*	Browse catalogue and make DIP request

Table 2: Exchange of messages in Consumer Registration of DIPRM

Message Sequence No.	*Message*	*Initiated by*	*Delivered to*	*Description*
1	Request Registration	Consumer	ISP	Consumer requests the ISP for registration
2	Collect Information	ISP	Consumer	ISP collects information from the consumer for registration
3	Validate Consumer	ISP	ISP	ISP validates information provided by the consumer
4	Confirmation	ISP	Consumer	ISP confirms the consumer about registration
5	Login	Consumer	ISP	Consumer login to the ISP

Table 3: Exchange of messages in Order Processing of DIPRM

Message Sequence No.	*Message*	*Initiated by*	*Delivered to*	*Description*
1	Login	Consumer	ISP	Consumer login to the ISP
2	Validate Consumer	ISP	ISP	ISP validate the authenticity of the consumer
3	Confirmation	ISP	Consumer	ISP confirms the consumer about login
4	Browse DP*	Consumer	ISP	Consumer browses DP in the catalogue provided by ISP
5	Make Order	Consumer	ISP	Consumer makes order of a DP
6	Payment Option	ISP	Consumer	ISP provides consumer different payment options
7	Make Payment	Consumer	ISP	Consumer makes payment for a DP
8	Payment Confirmation	ISP	Consumer	ISP confirms consumer on receiving payment
9	Collect DP*	ISP	Distributor	ISP collects DP from distributor
10	Send DP*	Distributor	ISP	Distributor sends DP to the ISP
11	Download DP*	Consumer	ISP	Consumer download DP from ISP
12	Collect Royalty	Distributor	ISP	Distributor collects royalty from the ISP

* DP=Encrypted DIP

Table 4: Exchange of messages in DIP Creation and Registration of DIPRM

Message Sequence No.	*Message*	*Initiated by*	*Delivered to*	*Description*
1	Create DIP	Creator	Creator	Creator creates DIP
2	Send DIP	Creator	Distributor	Creator sends DIP to distributor
3	Collect Information	Distributor	Creator	Distributor collects information about DIP from Creator
4	Register DIP	Distributor	DOR*	Distributor register DIP to DOR
5	Collect DOI**	DOR*	Distributor	Distributor collects DOI from DOR
6	Produce Metadata	Distributor	Distributor	Distributor produces metadata about DIP based on collected information
7	Create DP	Distributor	Distributor	Distributor creates DP
8	Collect Royalty	Creator	Distributor	Creator collects royalty from Distributor

*DOR=Digital Object Register, **DOI=Digital Object Identifier

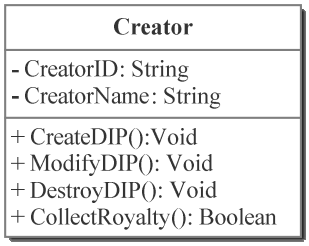

Figure 1: Class Creator

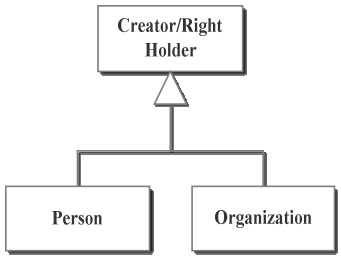

Figure 2: Generalization of Creator/Right Holder

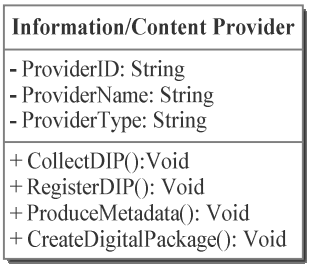

Figure 3: Class Information/Content Provider

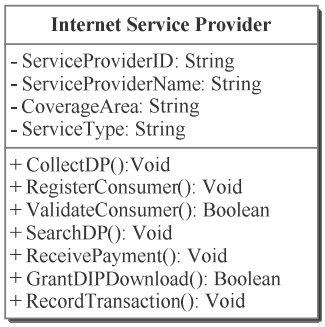

Figure 4: Class Internet Service Provider (ISP)

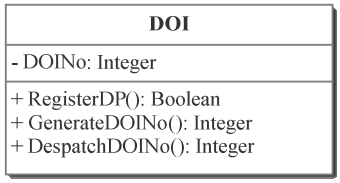

Figure 5: Class DOI

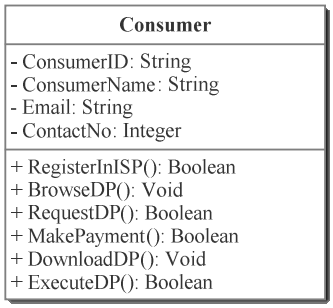

Figure 6: Class Consumer

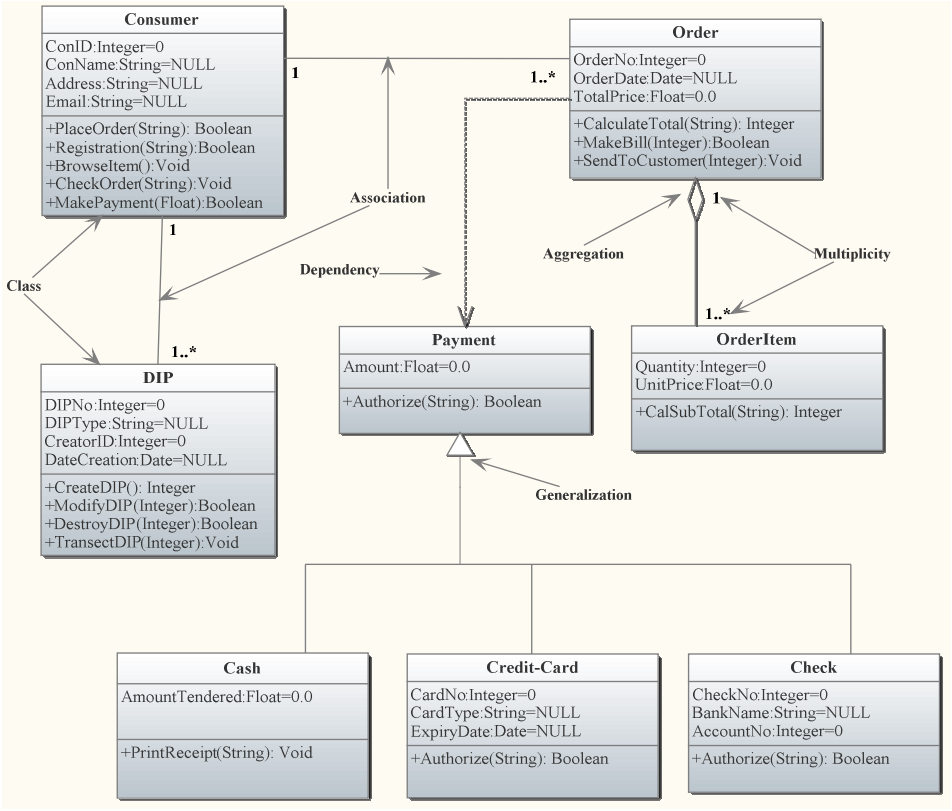

Figure 7: Class Diagram: DIP Order Processing

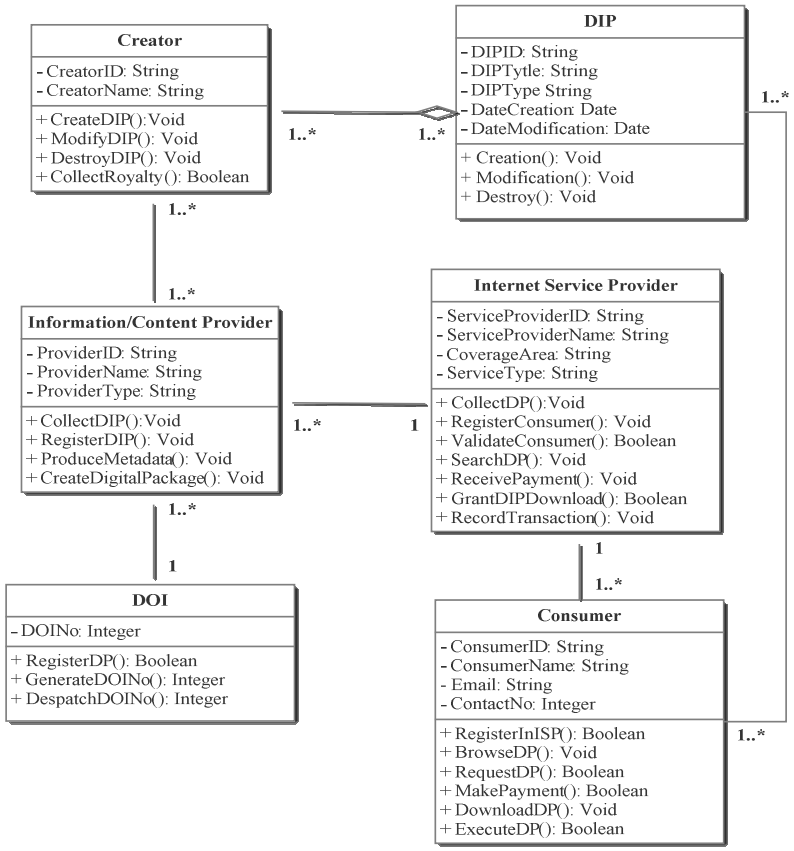

Figure 8: Class Diagram of DIPRM

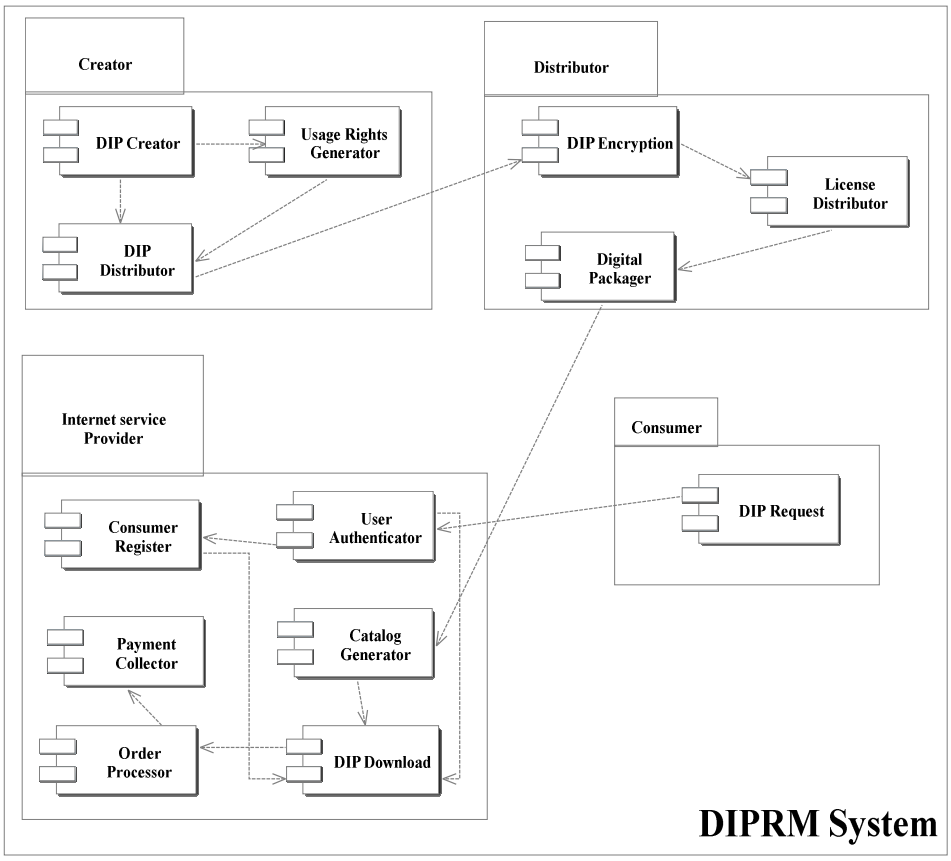

Figure 9: Component Diagram of DIPRM

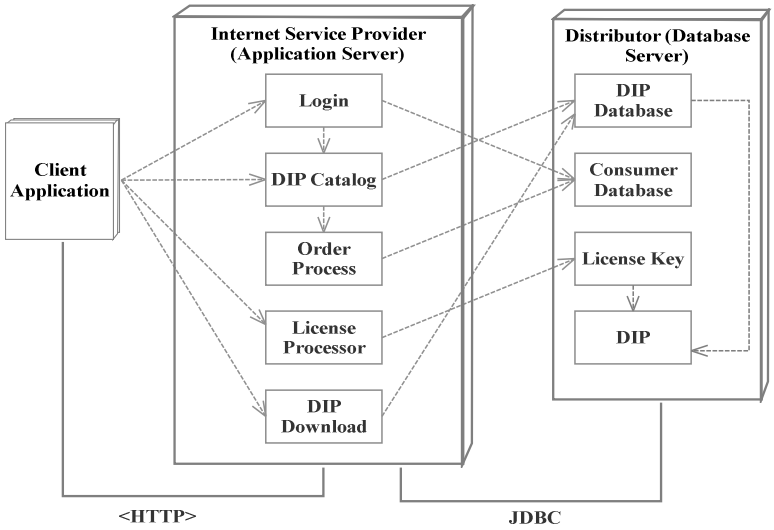

Figure 10: DIPRM: Deployment Diagram

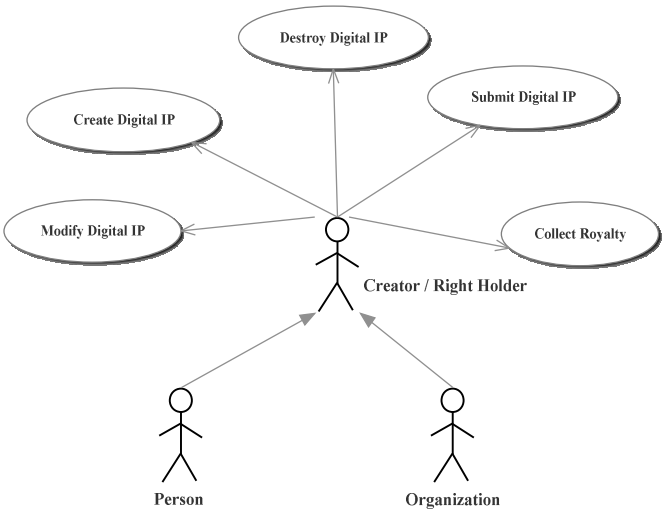

Figure 11: Creator/RH Use Case

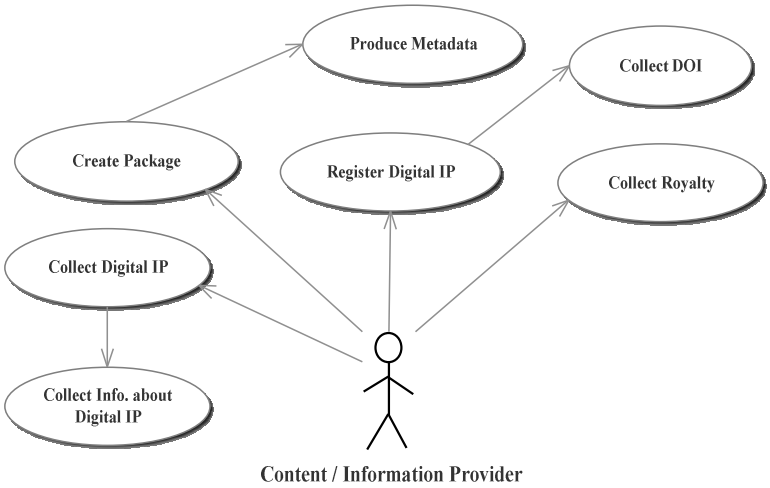

Figure 12: Content/Information Provider Use Case

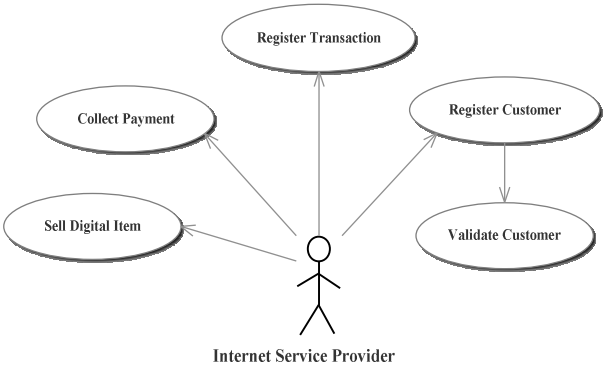

Figure 13: Internet Service Provider Use Case

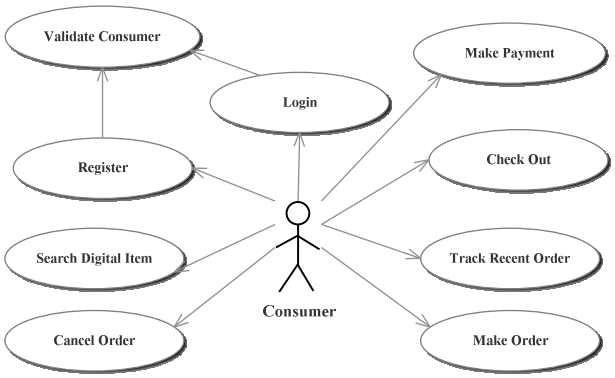

Figure 14: Consumer Use Case

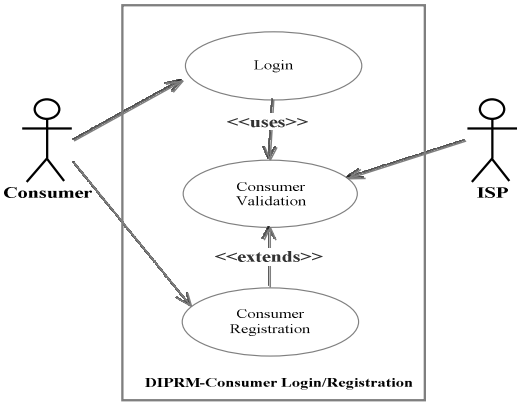

Figure 15: DIPRM Use case: Consumer Registration

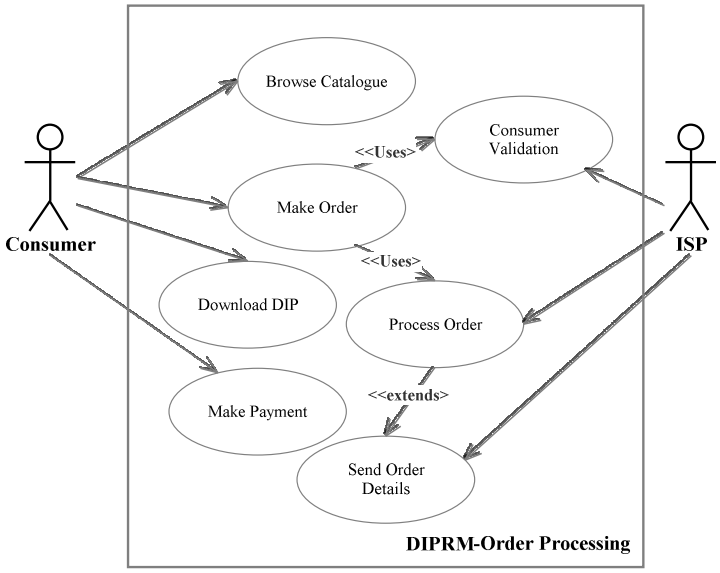

Figure 16: DIPRM Use Case: Order Processing

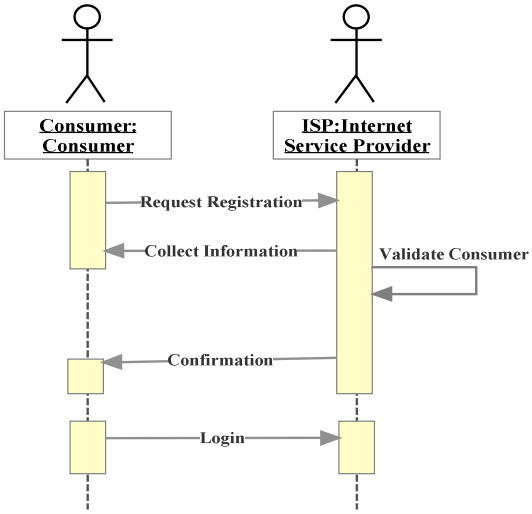

Figure 17: Sequence Diagram-New Consumer Registration

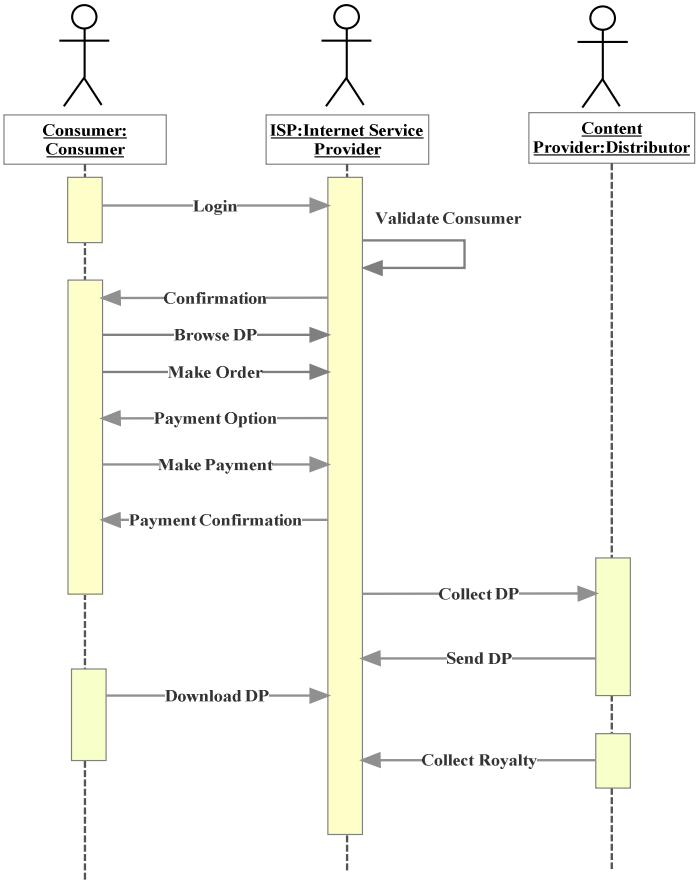

Figure 18: Sequence Diagram-Order Processing

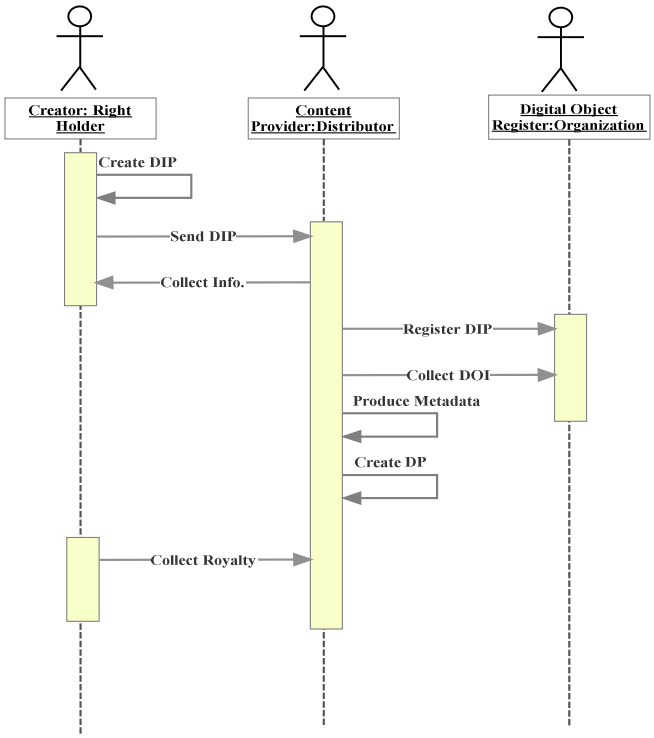

Figure 19: Sequence Diagram-DIP Creation and Registration

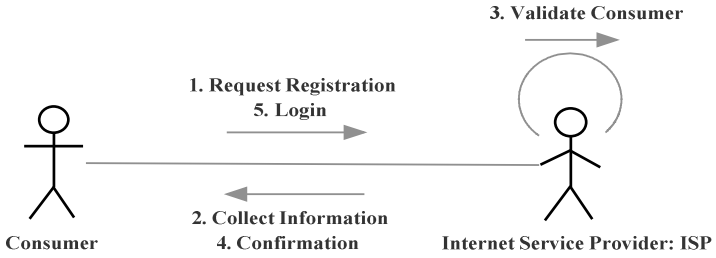

Figure 20: DIPRM Collaboration Diagram: Consumer Registration

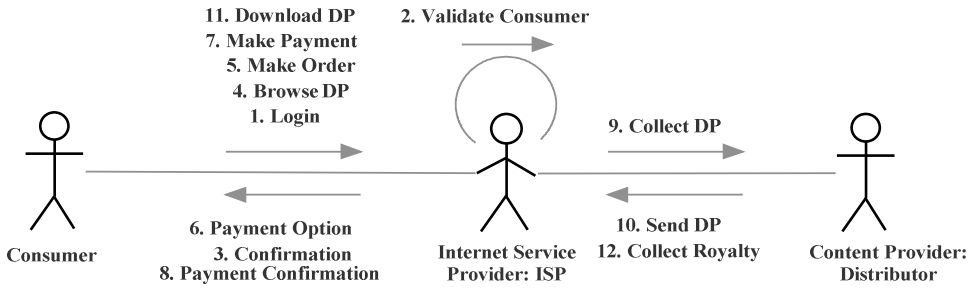

Figure 21: DIPRM Collaboration Diagram: Order Processing

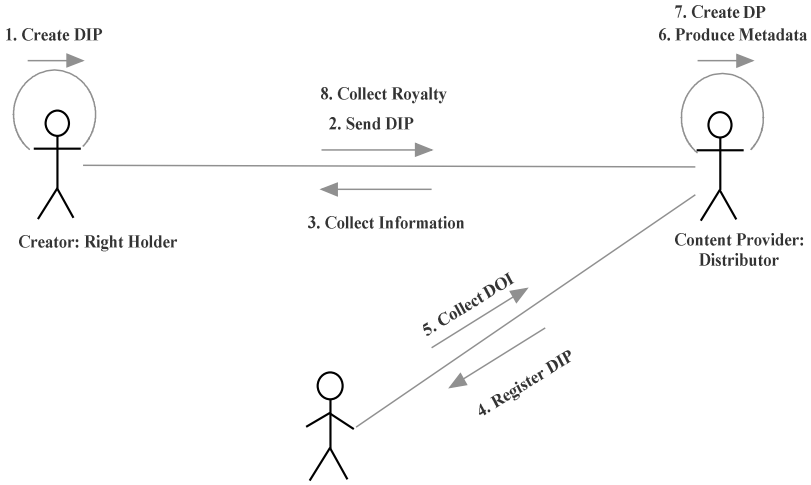

Figure 22: DIPRM Collaboration Diagram: DIP Creation and Registration

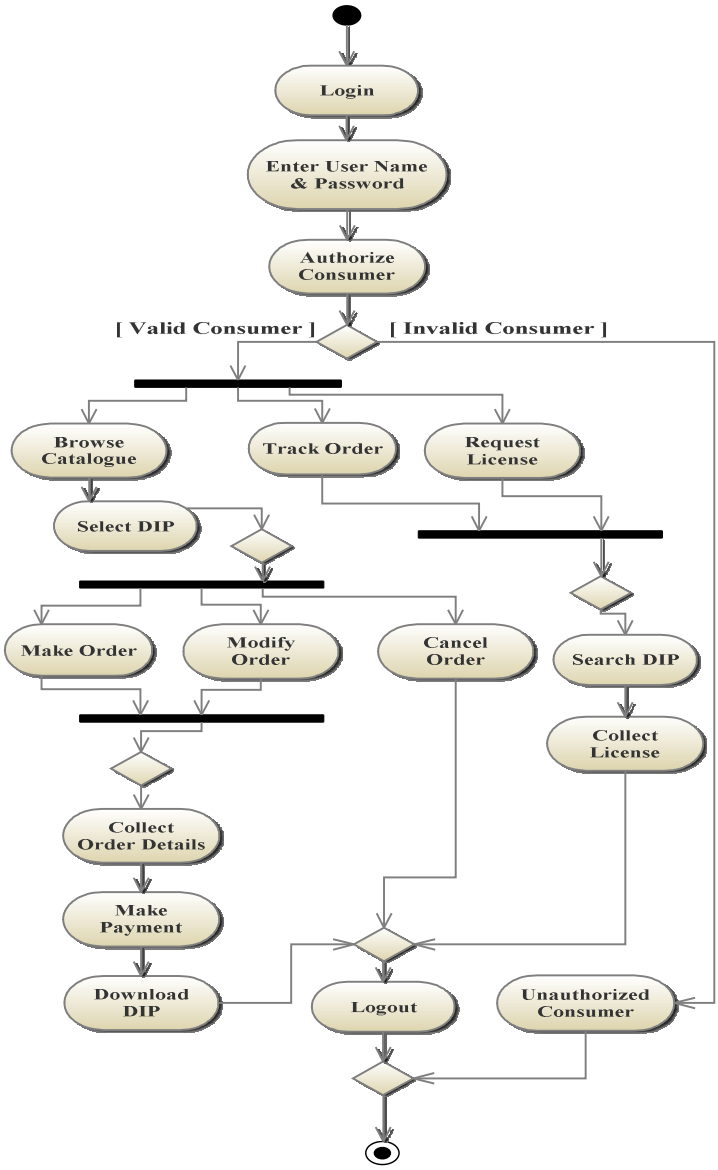

Figure 23: DIPRM: Activity Diagram

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Academic conference: http://www.iiste.org/conference/upcoming-conferences-call-for-paper/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar