

# Design of CORBA based Framework for Cyber University

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**Abstract :** Cyber university is a new field that can overcome the limitation of present education criteria. Student can receive learning in anywhere and anytime using information communication infrastructure. But, many researches in field of cyber university concentrate on development of solutions based application level. These solutions lack a flexibility and adaptability to be adapted in various environment of education.

In our research, we propose a framework that is not application level in solution for cyber university. This framework is designed using CORBA that is standard in distributed object middleware. The CORBA based framework can be integrated with other systems easily. The framework is mainly composed by four components. Course manager maintains all learning materials using workflow concepts. Student manager maintains profile and conditions of learning for each student. Intelligent agent determines learning step and coarse using student's condition dynamically. Session manager maintains group activity between lecture and students.

## 1. Introduction

In advance of computing power and networking technologies, Many applications are developed by many corporations and institutes. Especially, Cyber university is a new field that can overcome the limitation of present education criteria[Ellis 1998, Dewy 1998, Lee 1997, Barajas 1998, Mittrach 1998]. In Cyber University, students can access training and performance supports via the Internet when and where they need it[Wade 1998]. And, it significantly reduces the cost and time requirements associated with more traditional types of training. Now, many research and solutions are provided for construction of cyber university[Dewey 1998, Lee1997].

But, the structure of cyber university is regarded as very difficult process because of diversity of educational environments. In spite of diversity, almost of solution and researches are concentrated on application level. Application level based solutions lack a flexibility and adaptability to be adapted in various environment of education[Barajas 1998, Mittrach 1998].

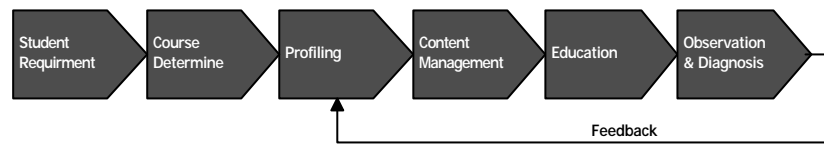
We proposed the framework-based solution for cyber university. Because of framework-based solution, the solution presents flexibility and adaptability to construction of cyber university in diverse environment.

## 2. Requirement for Framework

Cyber university can maintain a lot of learning contents effectively, and present contents to students by fit methods. Also, It is difficult for students to judge own state of learning and to determine subjects for achieve own goal. Because cyber university is less sufficient interaction between instructor and student than real university, functions that must determine student's coarse and monitor learning state are required. System can diagnose of the state of student and satisfaction of content presented to student, and determine learning step and coarse using student's condition dynamically. Also, because they would like to act on participants in group, group activity can supported by system[Manthe1996, Rezende 1995, Solyoll 1996].

Figure 1 describes the essence of education for cyber university. Cyber university allows students to access the topics they need, when they need them. Students may choose to play entire chapters, or utilize the search function to answer a specific question. System determines the best course which student can approve to own goal using user requirement. After course is determined, system composes user's profile and prepares learning contents for student and presents it

them. Then, students would learn learning contents by determined course. Result of learning is used by diagnose process. Diagnoses result is feedback to profiling.



**Figure 1. Essence of education for cyber university**

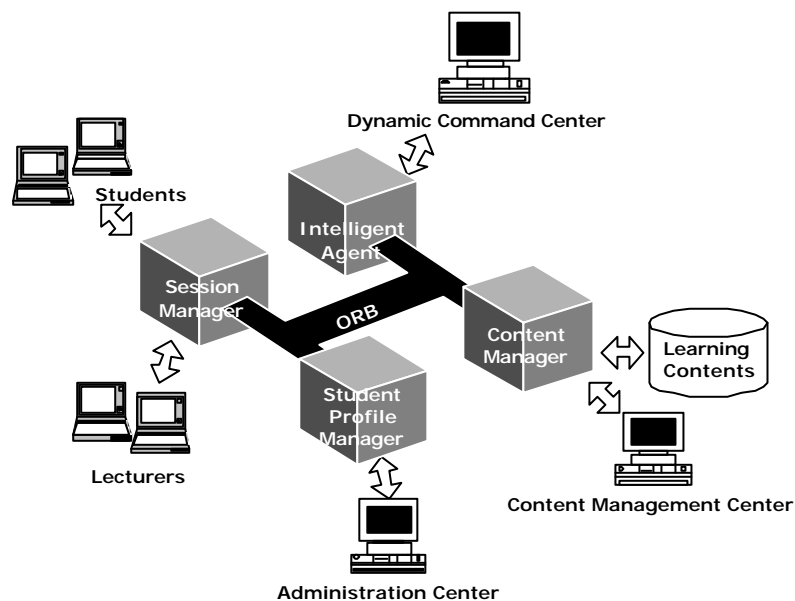
- Student Requirements : It is goal which student want to learn through cyber university.
- Course Determine : System determine student’s learning course using instructor’s knowledge.
- Profiling : It maintains student profile that contains private information with requirement which student want to learn, and topic information which students access.
- Content management : Content management maintains learning contest and provides it to student.
- Education : Students can learn the course and contents decided matching functionality.
- Observation & Diagnosis : The process of learning is monitored continuously and result of student’s learning and satisfaction are analyzed and returned feedback to students’ profiling.

### 3. Framework Design

In this paper, we design CORBA based framework for cyber university. The framework is mainly composed by four components and they are designed using CORBA objects. Therefore, this framework is integrated with external application and database. And it is used in heterogenius environment.

#### 3.1 Overview

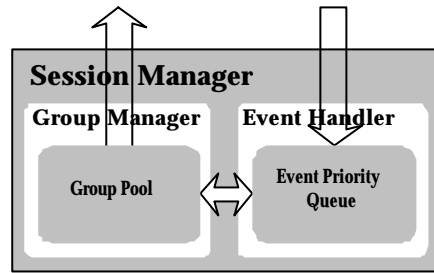
[Fig. 2] shows overall configuration of cyber university using the CORBA based framework.



**figure 2. CORBA based framework**

#### 3.1 Session Manager

In server side, session manager has group managing module and event handler. [Fig. 3] shows architecture of session manager.



**Figure 3: Session manager**

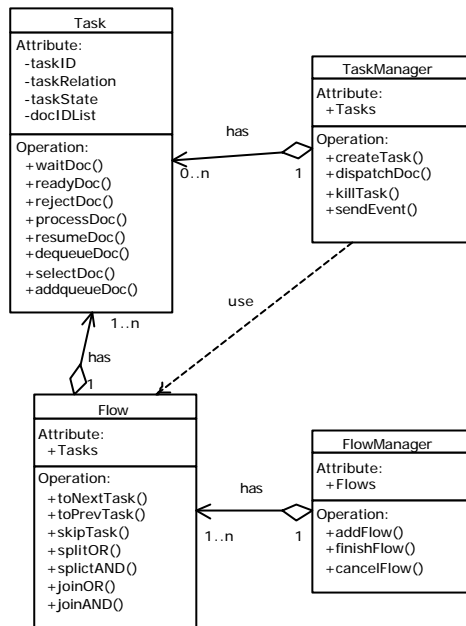
Group managing module operates as gateway. It authenticates using information in student profile manager. And it manages group participated by students and lecturer. Event handler processes events that occur in each group. Group managing module creates appropriate group for user requirement, and manages those using group pool. Once event occurs, interaction handler catches that. If it cannot be handled, interaction handler sends it to event handler. Event handler processed that using group managing interfaces. Events handled by event handler require group-related operations such as create, destroy, join, and leave. Table 1 describes operation of Session Manager.

**Table 1 Synchronous learning/training operations**

Operations	Functions
Basic Operations	Create Group
	Destroy Group
Group Management Operations	Join Group
	Leave Group
	Manage Applications
	Manage Time Event
	Control Token
	Manage Group Context
Data Transmission Operation	Support Unicast/Multicast
Information Management Operation	Manage and Retrieve User/Group Information

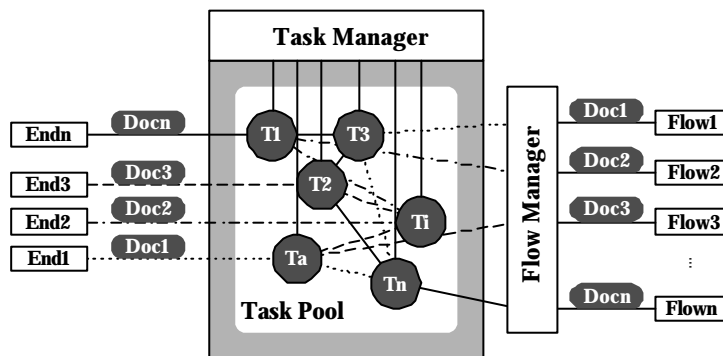
### 3.2 Content Manager

Content manager manages learning contents using workflow concepts. Workflow based data management presents efficient routing of work from person to person or to groups and easy access to pertinent documents. Task is defined students and authors who use contents. Also, Detailed reports of all activities associated with a process. This manager has task manager and flow manager. Author designs the flow and task of learning contents. Task manager and flow manager control the learning content and monitor actions which is performed to contents. Authors and instructors design flow. And course manager maintains components composed in document and relationship among the components. The relationships are made up with update and delete relation. [Fig 4] shows Flow, Task, Task Manager object.



**Figure 4. Objects of content manager**

For interface with database management systems, it uses persistence service in Common Object Specification Services (COSS). If we construct cyber university using the framework, this manager is connected to content management center. [Fig. 5] shows Course manager.



**figure 5. Course manager**

Content management center helps content professionals-creators, editors and site administrators- manage the full life cycle of content.

### 3.3 Student Profile Manager

Student profile manager maintains student profile, including student private information, result of learning, learning tendency. Profile manager presents operations described in Table 2.

**Table 2 Operations of Student Profile manager**

Operations	Functions
Basic Operations	Create Users
	Destroy Users
	Fine users
	Modify user profiles
	Registration user's goal
Maintenance of Learning State	Get Learning history
	Set Learning history

### 3.4 Intelligent Agent

Intelligent agent determines student's learning course using requirements. Knowledge base is constructed by instructors. Then, determined result is used for designing process of flow of contents in Content manager. Intelligent agent has extract module and diagnosis module. Extract module extracts parameters for diagnosis of student from result of student's learning and return to diagnosis module. [Fig.6] is IDL(Interface Definition Language) interface for Extraction module.

```
struct Problem_Struct {
    string testNodeID;
    string type;
    string difficulty;
    string correctness;
};
typedef sequence<Problem_Struct> Problem_info;
interface Extraction {
    string Solving_Problem(in User_info user, in Problem_info problem);
    string Learning_Node(in User_info user, in string Next);
}
```

**Figure 6. IDL interface for Extraction module**

Diagnosis module diagnoses learning state using parameters from extract module. Diagnosed result is used for updating profile information. [Fig.7] is IDL interface for Diagnosis module.

```
struct Condition_Struct{
    User_info user;
    string condition;
};
typedef sequence<Condition_Struct> Condition_info;
interface Diagnosis {
    Condition_info Examine( in string User_input );
}
```

**Figure 7. IDL interface for Diagnosis module**

## 4. Conclusion & Future Works

Designed framework has several advantages. It can provide flexible and adaptable solution for construction of cyber university. Learning course is designed automatically using student's requirements and result of learning is analyzed and feedback for the best fit education can be presented to students. Workflow based content management supports step-by-step education.

Also, because the framework is designed using CORBA objects, system expansion and integration can be done easily. There is an important feature to enhance educational values of this system. Currently, We plan to implement integrated distance learning system that using this framework.

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