1、 database table

EPHR table

Field name	data type	
recordID	Integer	PK
doctorID	Integer	FK
patientID	Integer	FK
drugID	Integer	FK
dose	Integer	
effectID	Integer	FK

Scientist table

Field name	data type	
scientistID	Integer	PK
name	varchar	
password	varchar	

Doctor table

Field name	data type	
doctorID	Integer	PK
name	varchar	
password	varchar	

Patient table

Field name	data type	
patientID	Integer	PK
patientName	varchar	
patientTelNO	Integer	
patientAddress	varchar	

Effect table

Field name	data type	
effectID	Integer	PK
effectName	varchar	
effectSpecification	varchar	

Drug table

Field name	data type	
drugID	Integer	PK
drugName	varchar	
recommendDose	Integer	

DEC table

Field name	data type	
drugID	Integer	PK,FK
effectID	Integer	PK,FK

EffectFile table

Field name	data type	
effectFileID	Integer	PK
patientID	Integer	FK
doctorID	Integer	FK
recordTime	date	
effectID	Integer	FK
severity	Integer	
firstObserved	date	

CRS table

Field name	data type	
crsID	Integer	PK
effectFileID	Integer	FK
drugFileID	Integer	FK
authorizedScientistID	Integer	FK

DrugFile table

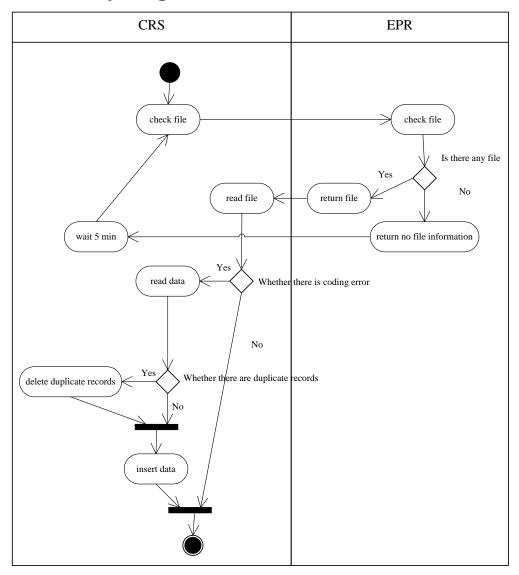| Field name	data type	
drugFileID	Integer	PK
patientID	Integer	FK
doctorID	Integer	FK
recordTime	date	
drugID	integer	FK
dose	Integer	
courseStarted	date	
courseEnded	date	

To keep the table easy to understand, the arrows for foreign key of two table (Effect File and Drug File) are not marked.
For the attribute "Dose", set it as integer, which means that how many need to be eaten for one day.

2、 **Activity diagram**

CRS system will first check whether the file exists in EPHR system. If the file does not exist, the system will wait 5 minutes before checking whether the file exists. When the file exists, the EPR system will return the file to the CRS system. The CRS system will read the file again and then check the coding. If the coding check fails, the file will not be recorded in the system. When the file code check is passed, the system starts to read

the data information of the file. When the data information has the same record in the system, the system will delete the duplicate record, and then insert the file information into the database.

3、 Software development methodology

The CRS system adopts the development method of waterfall model. In the waterfall model, the system development is divided into the following processes: planning, requirements analysis(for system and software), software design, programming, software testing and operation maintenance. CRS involves many systems and has a wide range of applications. In the process of design and development, CRS needs to fully consider the requirements, and can only be developed after the requirements are determined. This ensures that the functionality meets the user's needs. As a traditional software development method, waterfall model divides software development into several processes. Each process has documents to be delivered. On the one hand, it can standardize the development of CRS system, on the other hand, it can ensure the accuracy of functions.

4、 Work breakdown

a、 Tasks of developing, testing and deploying CRS system

The development of CRS system is divided into the following tasks: planning, requirement analysis, software design, programming, software testing and operation maintenance.

(1) Plan
1.1 analyze the CRS system and analyze the technical feasibility, economic feasibility and operation feasibility of the CRS system
1.2 develop the project plan for developing CRS system, and determine the start time, end time and content to be delivered of each project phase.

(2) Demand analysis
2.1 communicate with users.
2.2 analyze the role of CRS system and determine the role of CRS system.
2.3 based on the role of CRS system, analyze the functions that each role needs to achieve through CRS system.
2.4 analyze the nonfunctional requirements of CRS system and determine the

nonfunctional requirements of CRS system.

(3) Software design

3.1 the overall framework of CRS system is designed, including the functional architecture design, network architecture design and technical architecture design.

3.2 detailed design of CRS system, including the design of various functional modules in CRS system.

(4) Programming

4.1 according to the design result of CRS system in the software design, write the program.

4.2 deliver the program and deploy the beta program.

(5) Software testing

5.1 write software test cases according to requirements analysis.

5.2 divide the CRS system into test function points and determine the test plan.

5.3 carry out function test and performance test on CRS system.

5.4 when a bug is found in the test, it shall be submitted to the program developer for modification.

5.5 after the bug is modified, the CRS system is tested.

(6) Operation and maintenance

6.1 prepare CRS system to go online.

6.2 deploy the program to the formal environment.

6.3 prepare subsequent software maintenance manual.

b、 Project task assignment

(1) Plan: Project Manager, analyst, designer

(2) Demand analysis: Project Manager, analyst, designer

(3) Software design: analyst, designer, software developer

(4) Programming: software developers

(5) Software testing: testers, software developers

(6) Operation and maintenance: Project Manager, software developer, operation, and maintenance personnel

c、 Project task deliverables

(1) Make plan: Gantt chart, project plan

(2) Requirements analysis: requirements analysis documents

(3) Software design: outline design document, detailed design document

(4) Programming: program code, version test package

(5) Software test: test plan, test report

(6) Operation and maintenance: version release package, operation, and

maintenance manual

d、 Dependencies between project tasks

The relationship between tasks is waterfall. That is, after the previous task is completed, the next task can be started. If the previous task is not completed, it will affect the execution of subsequent tasks. Each task will generate a corresponding document, which will serve as a reference document for the next process. In the development of waterfall model, there is a strong dependence between tasks.

5、 Project plan

a、 description of phases of the project

(1) Make plan: analyze the feasibility of CRS system, including economic feasibility, technical feasibility, etc. At the same time, the CRS system development plan is planned to determine the time point of the project phase and the results to be delivered in each phase. The goal of the planning phase is to get a clear project plan.

(2) Requirement analysis: analyze the functions of CRS system, mainly communicate with users of CRS system to determine the functional requirements of the system. At the same time, it also analyzes the nonfunctional requirements of the system. In the requirement analysis stage, the goal is to have a clear understanding of the functions that CRS system needs to achieve, and to form a requirement analysis document.

(3) Software design: according to the requirements analysis documents formed in the requirements analysis stage, design the CRS system, design the program structure, the relationship between classes, etc. In the software design stage, the goal is to have a clear design of the CRS system program structure, and to form the outline design documents and detailed design documents.

(4) Programming: write program code according to the outline design documents and detailed design documents formed in the software design stage. In the programming stage, the goal is to complete the programming and form the deliverable code.

(5) Software testing: software testers need to test the function points and performance of CRS system according to the requirements analysis documents in the requirements analysis stage. In the software testing phase,

the goal is to carry out comprehensive functional test and performance test on CRS system, and form a test report.

(6) Operation and maintenance: after the completion of software test, CRS system needs to be put online in the operation and maintenance stage. At this stage, the goal to be achieved is that the system can operate stably and form an operation and maintenance manual.

b、 list of milestone descriptions and due dates

(1) Make plan: submit project plan, deadline: May 15, 2020.
(2) Demand analysis: submit demand analysis documents, as of June 5, 2020.
(3) Software design: submit outline design documents and detailed design documents, with the deadline of June 26, 2020.
(4) Programming: submit program code, deadline: July 10, 2020.
(5) Software test: submit test report, deadline: July 24, 2020.
(6) Operation and maintenance: Launch CRS system, submit operation and maintenance manual, deadline: July 31, 2020.
(For specific task due dates, the Gannt chart will specify in detail)

c、 Gannt Chart

ID	stage	Start date	End date	days	2020年05月				2020年06月				2020年07月			
					5/3	5/10	5/17	5/24	5/31	6/7	6/14	6/21	6/28	7/5	7/12	7/19
1	analyze the technical feasibility, economic feasibility and operation feasibility	2020/5/1	2020/5/5	3d												
2	develop the project plan	2020/5/5	2020/5/15	9d												
3	communicate with users	2020/5/15	2020/5/18	2d												
4	analyze the role of CRS system and determine the role of CRS system	2020/5/18	2020/5/22	5d												
5	analyze the functions that each role needs to achieve through CRS system	2020/5/22	2020/6/1	7d												
6	analyze the nonfunctional requirements of CRS system and determine the nonfunctional requirements of CRS system	2020/6/1	2020/6/5	5d												
7	functional architecture design, network architecture design and technical architecture design	2020/6/5	2020/6/15	7d												
8	the design of various functional modules in CRS system	2020/6/15	2020/6/26	10d												
9	write the program	2020/6/26	2020/7/6	7d												
10	deliver the program and deploy the beta program	2020/7/6	2020/7/10	5d												
11	write software test cases according to requirements analysis	2020/7/10	2020/7/10	1d												
12	divide the CRS system into test function points and determine the test plan	2020/7/13	2020/7/17	5d												
13	carry out function test and performance test on CRS system	2020/7/17	2020/7/22	4d												
14	submit to the program developer for modification	2020/7/22	2020/7/23	2d												
15	after the bug is modified, test CRS system	2020/7/23	2020/7/24	2d												
16	prepare CRS system to go online	2020/7/24	2020/7/27	2d												
17	deploy the program to the formal environment	2020/7/27	2020/7/28	2d												
18	prepare subsequent software maintenance manual	2020/7/28	2020/7/31	4d												

In the planning stage, the project plan needs to be submitted. In the requirements analysis phase, the requirements analysis documents need to be submitted. In the software design stage, it is necessary to submit the outline design documents and detailed design documents. In the programming phase, you need to submit the program code. In the software testing phase, a test report needs to be submitted. In the operation and maintenance stage, CRS system needs to be online and operation and maintenance manual needs to be submitted.

6、Qualitative cost benefit analysis

The cost of developing CRS system includes labor cost, software cost and hardware cost. When the system is online, it needs to build servers, purchase database software, server software, etc. These are fixed costs. After the CRS system goes online, it can provide the medical staff with the information about the specific effect of patients and the relationship between patients and specific drugs. It can provide the basis for human diagnosis and treatment to a certain extent and has social and economic benefits. In economy, economic benefits are greater than economic payouts. In technology, CRS system adopts Java technology, which is mature, so it is also feasible in technology. In terms of operation, HSE will support CRS system online, which is also feasible in terms of operation.