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| Harvard EXTENSION SCHOOL |
| Architecture & Design for Radiology Information Systems |
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# System Architecture

## Overview

The proposed, advanced revision to Radiology Information System (RIS) is presented to facilitate the procedure required for a patient to go through the imaging process in healthcare, along with technical storage and usage by healthcare workers. Digital Imaging Adoption Model (DIAM) recommends for future software design to marry the patient’s clinical information and images with their corresponding electronic medical records. I propose to solve this problem by revising an electronic image sharing software platform, called Radiology Information Systems (RIS), that joins the patient network with their images and EHRs, for enhanced interoperability for quicker and more efficient diagnoses. In this proposed system, many actors access it at different steps. In the previous project, functional requirements were stated involving all the actors and uses.

Advanced Radiology Information Systems (ARIS) will be a software platform that is integrated into patient portals and clinical settings as an installation, enhancing data flow of images with notes between an interconnected network. This would be a secure network operating on cloud storage in a Java workflow. Databases would be used in the use case diagrams on connectivity between the various actors in the system. Radiologic image compression would reduce the data volume using PACs. This lossy compression would use JPEG algorithms for the ability of patients to choose if they are reversible or not.

Diagram

Description automatically generatedCaption: Workflow of system with actors.

A quick traceability run through of the key requirements includes:

1. Referring physician can access RIS and place order for procedure
2. RIS can display worklist
3. Actor can schedule appointment
4. RIS can acquire an image for a patient
5. Radiologist can respond to patient images
6. Store technician info
7. Store patient information
8. Radiologist can review image retrieved from database
9. Store procedure status
10. Store images
11. Require Electronic Signature (Security Purposes)
12. Create and Read Reports (Radiologist)
13. Automatically retrieve demographic information and RP information
14. RIS and PACS pull pictures, reports, and patient information properly
15. See previous exams

## Recommendation

The system will be implemented entirely in Java using the JDK 14.

The System Architecture follows a modular microservice architecture. Each of the system components will be implemented as a microservice. To simplify the implementation, the same Java Virtual Machine (JVM) would be installed. This will allow direct Java level method access to the interfaces by the peer services and client applications. Security would be addressed via an authentication service which would identify the user through biometrics (face and/or voice recognition). Once identified, the authentication service is used to gain access to the platform.

Technologies:

* Java SDK – Latest Version through IntelliJ
* XAMPP – Apache distribute for MySQL Database

Each service will:

* Define a Java interface that provides a list of operations supported by the service.
* Provide an implementation in Java of the service interface.
* Fully encapsulate the service implementation details.

## Architecture Diagrams

Diagram, engineering drawing

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Caption: Class Diagram displaying actors and intertwining of roles.

Diagram

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Caption: Flow Chart explaining database and PACS technical requirements.

# High-Level Design

## Use Case

Diagram

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Caption: UML Use Case Diagram with actors and their abilities.

## Use Case

Diagram

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Caption: UML Use Case Diagram with packages detailing system operability.

# Additional Design Diagram

## 3.1 Sequence Diagrams

Diagram

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