

## Capstone Student Record Management System - README

### Overview:

A complete Java-based student management system supporting CRUD operations, persistent file storage, multithreading, sorting, searching, and exception handling. Uses OOP concepts including inheritance, abstraction, and interfaces.

### Features:

- Add, update, delete, search, and view students
- Persistent storage using students.txt
- Sorting by marks using Comparator
- Iterator-based display
- Exception handling with custom exceptions
- Multithreading for loading simulation
- Collections: ArrayList, HashMap
- RandomAccessFile demonstration
- OOP concepts: inheritance, abstraction, interfaces, polymorphism

### Project Structure:

src/model/Person.java

src/model/Student.java

src/service/RecordActions.java

src/service/StudentManager.java

src/service/StudentNotFoundException.java

src/util/FileUtil.java

src/util/Loader.java

src/MainApp.java

### File Format (students.txt):

rollNo,name,email,course,marks

### How to Compile:

```
javac -d . src/model/*.java src/service/*.java src/util/*.java src/MainApp.java
```

### How to Run:

```
java MainApp
```

Ensure students.txt is in the program directory.

Learning Outcomes:

- Implement OOP in modular design
- Use multithreading and exception handling
- Apply Java Collections and File Handling
- Use Comparator, Iterator, and custom exceptions