# PHI: Personal Health Information

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# Assignment 1 5/8/2023

For this assignment, you will describe and implement release 1 of your term project. You will incorporate *an abstract class*, *inheritance*, *upcasting or downcasting*, and *polymorphism*. You are free to choose a project that interests you but if you prefer, the instructor and your facilitator will be happy to suggest a topic. If you are already an experienced developer, this is an opportunity to build a challenging application (check with your facilitator if it requires significant API’s) or discuss research with the instructor. It is OK to name a project with much more scope than you can accomplish in the course (as in the example above): we will not hold you to completing everything associated with it. What we do expect is that you specify and implement a set of do-able requirements within such scope.

Submit this completed Word document. Replace as indicated. Please observe and retain the gray text. Your materials—in black 12-point Times New Roman—should not exceed 5 pages excluding references, figures, and appendices. Use the Appendix sections for additional material if you need to. These will be read only on an as-needed basis.

We want you to develop in Eclipse preferably or else IntelliJ (talk to your facilitator about exceptions). As you code, use JUnit tests whenever possible but certainly by week 2—package-by-package, class-by-class, and method-by-method, except for trivial methods and those requiring I/O. Use non-Junit classes for testing the latter. Keep the evaluation criteria in mind, listed at the end.

For this assignment, you do not need to read data from a file—you can build all data into the code if you wish.

Include a ReadMe file describing where to run the application from, and including necessary execution notes. All JUnit tests will be assumed runnable.

You are encouraged to leverage an AI generator as much as possible in completing this assignment unless you request an exemption in advance (which will probably be granted). You will be evaluated on your value added, as per the evaluation criteria. For every section “>>>AI generation …”, please check “I did not …” or (preferably) expand it (click the black arrowhead at left), provide the contents, then collapse the sections (again, using the arrowhead).

# 1 SUMMARY DESCRIPTION

One- or two-paragraph overall description of your proposed term project—half-page (12-point Times New Roman) limit. By the end, term projects will incorporate most of the techniques discussed in the course. To do this, you may need to alter the direction of your project or introduce an additional project in future. You may alter this or even replace it as the semester progresses. You will probably find it useful to use your project acronym.

This project aims to develop a health tracking app for users to keep track of their personal health information. Users will create an account with login credentials and have the ability to input and track their own health information, such as BMI, blood pressure, and cholesterol. Additionally, users will have the option to add custom health problems and track them over time through notes. Information should be verified and stored in a secure database.

The app also allows for parents to input and track their children's immunization records under their account. This app will utilize various Java concepts such as object-oriented programming (OOP) for creating classes and inheritance relationships between them, exception handling for robustness and error handling, concurrency for multi-threading, JavaFX for creating a user-friendly graphical user interface (GUI), and Java Database Connectivity (JDBC) for storing and retrieving health information from a database. Additionally, the app will also make use of various Java APIs and libraries for handling health-related calculations and functions. With an emphasis on privacy, each user has complete control over who they share their health information with. Overall, this app provides a convenient and organized way for users to track their personal health information and their family's health records in a secure and private manner.

### >>>AI generation OR check: *I did not use AI generation here* \_\_(Please collapse this before submitting.)

(1) PARAGRAPH DESCRIBING YOUR VALUE ADDED TO THE AI-GENERATED MATERIAL

The AI response was great as a starting point for my project. It gave me a strong idea of what my project can achieve and what improvements can be made. As a human being, I can utilize this and mix my own ideas and creativity to come up with a more customizable and productive app. Using a well-versed prompt helped me to get as much accurate information as the AI could generate about the project. However, I added/edited some lines to explain how some of the java concepts from this code may be used for this app. I also added some unique features like adding custom health information, adding children immunization records. Additionally, I can also incorporate my unique experience and functionalities into the system to better suit the app towards my own preferences. I may not necessarily use graphs, charts for example. Overall, my own perspective and creativity will be biggest value added to this AI generated material.

(2) MY PROMPT SEQUENCE (ONLY)

[1]

I want to create a "personal health information" Java project using some java concepts. I would like the app to be able to record common health information that is trackable, and the information is only visible to each users. Write me a two paragraphs of half page overall summary that uses.

(3) CODE OR TEXT PRODUCED BY THE ABOVE PROMPT SEQUENCE

chatGPT\_\_ CODEX\_\_OTHER (please specify)\_\_\_

cchatGPT:  
The "Personal Health Information" Java project aims to provide a platform for users to record their common health information that is trackable and only visible to them. The application will allow users to track their health data such as blood pressure, weight, cholesterol levels, BMI, and notes related to their health. The user data will be stored in a database and accessed through the application. The application will allow users to view their data in different formats such as graphs, tables, and charts.

The application will require users to sign up and create an account with their personal details such as name, age, and contact information. The user will be required to provide their health data that will be stored securely in the database. The user will be able to add, update, or delete their health data at any time. The application will also provide an option for users to export their health data in a standard format that can be shared with their healthcare providers if needed. Overall, the Personal Health Information project aims to empower users to take control of their health by providing a platform to track and manage their health data in a convenient and securely.

## 2 I/O EXAMPLE FROM *PROJECTED* COMPLETED PROJECT *EVALUATION CRITERION (i) APPLIES*

Provide an example of projected *concrete* output for designated input. You will not be held to fulfilling exactly this—it is just explanatory at this point, to indicate where your project is going. We recognize that project direction and details will change as the term progress. This section refers to the project as a whole, not just to what you will produce this week, so we can gain an idea of what you have in mind overall.

Input: A user logs into their account and enters their latest blood pressure readings (120/80) and their current BMI (23).

Output: The app displays the user's blood pressure and BMI readings along with a history table showing their progress over time(possibly) before saving it to the database. The user may also see personalized recommendations for maintaining their blood pressure and BMI in a healthy range based on their age, gender, and other factors. The app automatically saves the inputted information to the user's account and updates their health record.

This is just one potential example of how the app may be used.

### >>>AI generation OR check: *I did not use AI generation here* \_\_(Please collapse this before submitting.)

(1) PARAGRAPH DESCRIBING YOUR VALUE ADDED TO THE AI-GENERATED MATERIAL

The AI thoughtfully evaluated my prompt and provided an example of input output. It described how the app will ask for user input to basically store individuals as part of a group and then it will ask for health information from the user and output the status. It is a great example of the i/o for my projected completed PHI project. However, I can certainly see how my own perspective will modify this example already. I can customize whatever I want to output based on the user input. I don’t necessarily have to display the information in a chart or graph. I can simply record the information and display what the recommended numbers are and provide a simple table of the historical data. This way, I am not totally off the rail from the AI generated material, rather I just added my own thought process into it.

(2) MY PROMPT SEQUENCE (ONLY)

[1]

Can you give me one i/o example expected from the projected completed project?

(3) CODE OR TEXT PRODUCED BY THE ABOVE PROMPT SEQUENCE

chatGPT\_\_ CODEX\_\_OTHER (please specify)\_\_\_

chatGPT:

Here’s an example of input/output:  
Input:

* User logs in to their account
* User selects the "Blood Pressure" category from the app's menu
* User enters their latest blood pressure reading (120/80)
* User saves the entry

Output:

* The app displays the user's blood pressure entry in a graph and chart format, with the latest reading prominently displayed
* The app also shows the user's historical blood pressure data over time, highlighting any trends or changes
* The app may also provide feedback or recommendations based on the user's blood pressure data, such as encouraging them to see a doctor if their readings are consistently high

## 3 REQUIREMENTS IMPLEMENTED IN THIS RELEASE

Supply [functional requirements](https://docs.google.com/document/d/1eU7eINLDxmrf793D4OF2yGT4ry_SW3GQGoVDYzecGHc/edit?usp=sharing) statement that you accomplished for this assignment, i.e., functionality that the application provides for the user. Please state requirement in declarative form, as illustrated in the examples, because here we want to know the functionality intended (*what*, not *how*). For example, the following is *not* a proper functional requirement: *TicTac will have a class for O’s and a class for X’s.* It is common to mistake design elements like this for requirements. To get started, state what the application will accept as input, like requirement 3.1 below.

Keep in mind that the implementation of your requirements will incorporate *an abstract class*, *inheritance*, *upcasting or downcasting*, and *polymorphism*; that will probably influence the requirements you choose to implement in this assignment.

### >>>AI generation OR check: *I did not use AI generation here* \_\_(Please collapse this before submitting.)

(1) PARAGRAPH DESCRIBING YOUR VALUE ADDED TO THE AI-GENERATED MATERIAL

The chatGPT response based on my prompt was quite satisfactory as a starting point. It helped me to bound my thought process to focus on the key requirements of the app. However, I needed to step up and modify the responses such that the requirements follow the functional requirement guideline provided in the section. I simplified the response to clarify what the actual requirements are. I also switched the requirements in the order that it makes sense to human such as, be able to login first then be able to input health info etc.With that modification, I believe I added a significant value to the AI response to create a solid, clear, and functional requirement for my PHI project.

(2) MY PROMPT SEQUENCE (ONLY)

[1] For my “Person health information” app can you generate one functional requirement (what the app shall be able to do, not how to) that will incorporate an abstract class, inheritance, upcasting or downcasting, and polymorphism.

[2] Could you give me another requirement which is functional but simple? i.e. the app should allow user register/login two the system in two lines?

(3) CODE OR TEXT PRODUCED BY THE ABOVE PROMPT SEQUENCE

chatGPT\_\_ CODEX\_\_OTHER (please specify)\_\_\_

chatGPT:  
[1]

One functional requirement statement that is accomplished in this assignment is that the application allows users to input and track their personal health information, including BMI, blood pressure, and cholesterol levels. This requirement involves the implementation of an abstract class (e.g. HealthInfo) that serves as a base class for specific health information classes (e.g. BMIInfo, BloodPressureInfo, and CholesterolInfo) that inherit from it. The use of inheritance enables the upcasting and downcasting of objects to the HealthInfo class, which allows for polymorphic behavior when accessing and manipulating health information data.

[2]

Sure! How about this: "The app should provide a user registration feature that allows users to create an account with a unique username and password. The app should also allow registered users to log in to the system using their username and password."

Continue with at most two more requirements.

## 3.1 Adding User

The application shall allow users to register/login with their personal information, username, email, and password.

## 3.2 Adding/editing health information for individual users

The application shall allow users to input/edit their personal health information, including BMI, blood pressure, cholesterol levels, and any other custom health conditions.

## 3.3 Recording Children Health Information

## The application should allow for parent/user to input and track their children's immunization records under their account.

## 4 ILLUSTRATIVE OUTPUT FROM IMPLEMENTATION

### Provide illustrative output from your implemented application (so far) showing that the requirements have been met. Explain what class.method(s) produce it.

The Main class’s main method is used to provide the following output based on the project progress so far.

User's health data:

Blood Pressure: Recorded at: Fri May 12 12:40:26 EDT 2023

Metric: Blood Pressure

Systolic BP: 120

Diastolic BP: 80

BMI: 23.5

Age: 35

Weight: 145.0

LDL Cholesterol: 100

HDL Cholesterol: 60

Triglyceride Cholesterol: 120

Diabetes: No

one example to prove downcasting: age - 35

Notes: ankle pain on 5-12-2023

after downcasting, - ankle pain on 5-12-2023

### >>>AI generation OR check: *I did not use AI generation here* \_No\_(Please collapse this before submitting.)

(1) PARAGRAPH DESCRIBING YOUR VALUE ADDED TO THE AI-GENERATED MATERIAL

Your response replaces this.

(2) MY PROMPT SEQUENCE (ONLY)

[1]

A copy of your first prompt replaces this.

[2]

etc.

(3) CODE OR TEXT PRODUCED BY THE ABOVE PROMPT SEQUENCE

chatGPT\_\_ CODEX\_\_OTHER (please specify)\_\_\_

Your response replaces this.

## 5 YOUR DIRECTORY

### Show a screenshot of your directory. This should include a parallel directory of JUnit tests where possible—package-by-package, class-by-class, and method-by-method, except for trivial ones.

A screenshot of a computer

Description automatically generated with medium confidence

## 6 TECHNIQUES IMPLEMENTED

Your implementation should include *inheritance*, *polymorphism*, and *either an abstract class or interface* at least once, and in a manner that is useful to your application. Explain where and how you applied these, using the headings below.

### 6.1 Class model and Sequence Diagram

Identify where you included *inheritance*, *polymorphism*, and *abstract classes* or *interfaces* in your class model. Make classes and members *static* or not as per their intended usage. To do this use tools (e.g., Visio, Lucidchart, or draw.io), PowerPoint, or a combined model as in [this example](https://docs.google.com/spreadsheets/d/1wnua9en_nwBITm-pNiQTn7QzP1ylu9LK2QJeELa2GrA/edit?usp=sharing) (which you are free to cut and paste from). Insert indications in red to show where the three features below apply.

Table

Description automatically generated

A picture containing text, screenshot, diagram, parallel

Description automatically generated

### >>>AI generation OR check: *I did not use AI generation here* \_No\_(Please collapse this before submitting.)

(1) PARAGRAPH DESCRIBING YOUR VALUE ADDED TO THE AI-GENERATED MATERIAL

(2) MY PROMPT SEQUENCE (ONLY)

[1]

(3) CODE OR TEXT PRODUCED BY THE ABOVE PROMPT SEQUENCE

chatGPT\_\_ CODEX\_\_OTHER (please specify)\_

### 6.2 Code showing an abstract class or interface

Show the relevant code (only) and explain why an abstract class or interface is appropriate here. It should be clear where the code is located (class and method).

The HealthData class is defined as abstract class and therefore it cannot be instantiated. It has some default methods and fields. Classes that extend to HealthData class can be instantiated and use the methods of HealthData class. Even though some methods could have been left unimplemented(abstract) here, I implemented most of them. The two unimplemented methods must be implemented in the subclasses. I didn’t need AI help to identify this.

**package** PHI;

**import** java.util.Date;

**public** **abstract** **class** HealthData {

**private** String name;

**private** Date date;

**public** HealthData(String name, Date date) {

**this**.name = name;

**this**.date = date;

}

**public** String getName() {

**return** name;

}

**public** Date getDate() {

**return** date;

}

**public** **abstract** String getMetric();

**public** **abstract** String getData();

}

### >>>AI generation OR check: *I did not use AI generation here* \_\_(Please collapse this before submitting.)

(1) PARAGRAPH DESCRIBING YOUR VALUE ADDED TO THE AI-GENERATED MATERIAL

I have simplified the response by editing the chatGPT code. I removed the systemout statements and implemented them in the getData() method of commonhealthdata class to show polymorphism clearly.

(2) MY PROMPT SEQUENCE (ONLY)

[1] Show me how polymorphism, downcasting can be implemented with the project progress so far? Please use the classes I provided earlier and show me as a test case in the main method.

A copy of your first prompt replaces this.

(3) CODE OR TEXT PRODUCED BY THE ABOVE PROMPT SEQUENCE

chatGPT\_\_ CODEX\_\_OTHER (please specify)\_\_\_

chatGPT:  
// Create a user with some health data

User user = new User("John", "Doe", "johndoe@example.com", "Passw0rd", new Date(), "Male", "555-1234");

HealthData commonHealth = new CommonHealthData("Blood Pressure", new Date(), "Blood Pressure", 120, 80, 23.5, 35, 145.0, 100, 60, 120, false);

HealthData customHealth = new CustomHealthData("Ankle pain on 5-12-2023", new Date());

customHealth.addNote("Note 1");

customHealth.addNote("Note 2");

user.addHealthData(commonHealth);

user.addHealthData(customHealth);

// Print out the user's health data

System.out.println("User's health data:");

for (HealthData healthData : user.getHealthDataList()) {

System.out.println(healthData.getMetric() + ": " + healthData.getData());

// Demonstrate polymorphism and downcasting

if (healthData instanceof CommonHealthData) {

CommonHealthData common = (CommonHealthData) healthData;

System.out.println("Recorded at: " + common.getDate());

System.out.println("Systolic BP: " + common.getSystolicBP());

System.out.println("Diastolic BP: " + common.getDiastolicBP());

System.out.println("BMI: " + common.getBmi());

System.out.println("Age: " + common.getAge());

System.out.println("Weight: " + common.getWeight());

System.out.println("LDL Cholesterol: " + common.getLdlCholesterol());

System.out.println("HDL Cholesterol: " + common.getHdlCholesterol());

System.out.println("Triglyceride Cholesterol: " + common.getTriglycerideCholesterol());

System.out.println("Diabetes: " + (common.isDiabetes() ? "Yes" : "No"));

} else if (healthData instanceof CustomHealthData) {

CustomHealthData custom = (CustomHealthData) healthData;

for (String note : custom.getNotes()) {

System.out.println("- " + note);

}

}

}

### 6.3 Code showing polymorphism

Show the relevant code (only) and explain why *polymorphism* is appropriate here. Recall that polymorphism is implemented in one of two ways – overriding methods in subclasses or overloading methods in the same class where the method signatures are different – and allowing the language runtime to dynamically invoke the correct method. It should be clear where the code is located (class and method).

I am using polymorphism in both CustomHealthData and CommonHealthData class. In the example below, polymorphism can be identified in line 27-28 in the for loop. Because of polymorphism, the healthdata can distinguish between the getData() of commonhealthdata class and customhealthdata class.

You can find the getData() method that was overridden in those two classes.

A screenshot of a computer code

Description automatically generated with low confidence

The code above Signifies the polymorphism(taking many forms). You can see the ouputs in section 4.

### >>>AI generation OR check: *I did not use AI generation here* \_\_(Please collapse this before submitting.)

(1) PARAGRAPH DESCRIBING YOUR VALUE ADDED TO THE AI-GENERATED MATERIAL

Gave me a handy example—but I had to strip off extra example codes because I only needed one or few lines to show downcasting. I modified the last few lines to print out the notes from the constructor using the sysout to prove downcasting is working. You can see them at the code snippet.

(2) MY PROMPT SEQUENCE (ONLY)

[1] Show me how polymorphism, downcasting can be implemented with the project progress so far? Please use the classes I provided earlier and show me as a test case in the main method.

(3) CODE OR TEXT PRODUCED BY THE ABOVE PROMPT SEQUENCE

chatGPT\_\_ CODEX\_\_OTHER (please specify)\_chatGpt\_\_

package PHI;

import java.util.ArrayList;

import java.util.Date;

public class Main {

public static void main(String[] args) {

// Create a user with some health data

User user = new User("John", "Doe", "johndoe@example.com", "password", new Date(), "Male", "555-1234");

HealthData commonHealth = new CommonHealthData("Blood Pressure", new Date(), "Blood Pressure", 120, 80, 23.5, 35, 145.0, 100, 60, 120, false);

HealthData customHealth = new CustomHealthData("Custom Notes", new Date());

customHealth.addNote("This is a custom note");

customHealth.addNote("This is another custom note");

user.addHealthData(commonHealth);

user.addHealthData(customHealth);

// Print out the user's health data

System.out.println("User's health data:");

for (HealthData healthData : user.getHealthDataList()) {

System.out.println(healthData.getMetric() + ": " + healthData.getData());

// Demonstrate polymorphism and downcasting

if (healthData instanceof CommonHealthData) {

CommonHealthData common = (CommonHealthData) healthData;

System.out.println("Recorded at: " + common.getRecordedAt());

System.out.println("Systolic BP: " + common.getSystolicBP());

System.out.println("Diastolic BP: " + common.getDiastolicBP());

System.out.println("BMI: " + common.getBmi());

System.out.println("Age: " + common.getAge());

System.out.println("Weight: " + common.getWeight());

System.out.println("LDL Cholesterol: " + common.getLdlCholesterol());

System.out.println("HDL Cholesterol: " + common.getHdlCholesterol());

System.out.println("Triglyceride Cholesterol: " + common.getTriglycerideCholesterol());

System.out.println("Diabetes: " + (common.isDiabetes() ? "Yes" : "No"));

} else if (healthData instanceof CustomHealthData) {

CustomHealthData custom = (CustomHealthData) healthData;

System.out.println("Notes:” +custom.addNote())

}

}

}

}

}

### 6.4 Code showing upcasting or downcasting

Show the relevant code (only) and explain why upcasting or downcasting is appropriate here. It should be clear where the code is located (class and method).

Here is one example of where I can use down casting. I am printing out in line 33 and 37 to prove downcasting. It might it change later,

A screenshot of a computer code

Description automatically generated with low confidence

### >>>AI generation OR check: *I did not use AI generation here* \_\_(Please collapse this before submitting.)

(1) PARAGRAPH DESCRIBING YOUR VALUE ADDED TO THE AI-GENERATED MATERIAL

Your response replaces this.

(2) MY PROMPT SEQUENCE (ONLY)

[1]

A copy of your first prompt replaces this.

[2]

etc.

(3) CODE OR TEXT PRODUCED BY THE ABOVE PROMPT SEQUENCE

chatGPT\_\_ CODEX\_\_OTHER (please specify)\_\_\_

Your response replaces this.

## 7 YOUR CODE

Unless your facilitator requests another method, copy your Eclipse project to your file system, zip it, and attach it. Please contact your facilitator in advance if you want to request an alternative means.

  
github link: https://github.com/mahimcbu/CS622/tree/main/Assignments/Hw1/phi

### >>>AI generation OR check: *I did not use AI generation here* \_\_(Please collapse this before submitting.)

(1) PARAGRAPH DESCRIBING YOUR VALUE ADDED TO THE AI-GENERATED MATERIAL

As you can see the AI generated a long list of classes and methods which helped me to get started with quickly. It was obvious that a lot of the methods, variables were not exactly what I intented to see at the beginning, so I kept on modifying, separating the classes, adding new methods, variables to make the code functional to what my original intention was. The code files are included in the zip file.

(2) MY PROMPT SEQUENCE (ONLY)

[1] This project aims to develop a health tracking app for users to keep track of their personal health information. Users will create an account with login credentials and have the ability to input and track their own health information, such as BMI, blood pressure, and cholesterol. Additionally, users will have the option to add custom health problems and track them over time through notes. Based on that, can you give me the classes in java code? Make sure the use of java oop is there.

(3) CODE OR TEXT PRODUCED BY THE ABOVE PROMPT SEQUENCE

chatGPT\_\_ CODEX\_\_OTHER (please specify) chatGPT\_\_\_

import java.util.ArrayList;

import java.util.Date;

abstract class HealthData {

private String name;

private Date date;

public HealthData(String name, Date date) {

this.name = name;

this.date = date;

}

public String getName() {

return name;

}

public Date getDate() {

return date;

}

public abstract String getMetric();

public abstract String getData();

}

class CommonHealthData extends HealthData {

private String metric;

private String data;

public CommonHealthData(String name, Date date, String metric, String data) {

super(name, date);

this.metric = metric;

this.data = data;

}

@Override

public String getMetric() {

return metric;

}

@Override

public String getData() {

return data;

}

}

class CustomHealthData extends HealthData {

private ArrayList<String> notes;

public CustomHealthData(String name, Date date) {

super(name, date);

notes = new ArrayList<>();

}

public void addNote(String note) {

notes.add(note);

}

public ArrayList<String> getNotes() {

return notes;

}

@Override

public String getMetric() {

return "Notes";

}

@Override

public String getData() {

StringBuilder builder = new StringBuilder();

for (String note : notes) {

builder.append(note).append("\n");

}

return builder.toString();

}

}

class User {

private String username;

private String password;

private ArrayList<HealthData> healthData;

public User(String username, String password) {

this.username = username;

this.password = password;

healthData = new ArrayList<>();

}

public String getUsername() {

return username;

}

public boolean checkPassword(String password) {

return this.password.equals(password);

}

public ArrayList<HealthData> getHealthData() {

return healthData;

}

public void addHealthData(HealthData data) {

healthData.add(data);

}

}

## 8 EVALUATION OF ASSIGNMENT 1



## Appendix 1 (if needed; should be referenced above, and will be read as-needed only)

## Appendix 2 (if needed; should be referenced above, and will be read as-needed only)