# PHI: Personal Health Information

e.g., PANTRACK: A System for Tracking Pandemics in Iceland

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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.

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 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. 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. 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.

[2]

Using java Object-oriented programming, JavaFX, and java database connectivity, can you generate a two paragraphs description of my term project "personal health information"?

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

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

cchatGPT:  
This project aims to create a health app in Java that allows users to track their health information. The app will provide users with a dashboard where they can enter their basic health information such as height, weight, and blood pressure. The app will also include a feature for tracking the user's medical history such as past surgeries, allergies, and medication history. The user can also view a summary of their overall health, including their BMI, blood pressure, and other relevant metrics.

The app will be designed with object-oriented programming principles in mind, utilizing concepts such as inheritance, encapsulation, and polymorphism. The app will also make use of JavaFX for the user interface and Java Database Connectivity (JDBC) for connecting to a database to store and retrieve user information. Additionally, the app will implement exception handling and text handling to ensure that user input is properly validated and handled. Overall, the health app aims to provide users with an easy-to-use platform for tracking and monitoring their health, while also utilizing various Java concepts and tools.

## 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 graph showing their progress over time(possibly). 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 is the recommended numbers are and provide a simple graph 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]

ok, can you give me one i/o 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. 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.

(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.

Continue with at most two more requirements.

## 3.1 Adding health information for individual users

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

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.

## 3.2 Recording Children Health Information

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

This requirement involves the implementation of a User class that serves as a base class for specific user types (e.g. ParentUser and ChildUser) that inherit from it. The use of inheritance enables the upcasting and downcasting of objects to the User class, which allows for polymorphic behavior when accessing and manipulating user account data. Additionally, this requirement involves the implementation of a database to store and retrieve health information and user account data, utilizing Java Database Connectivity (JDBC) to connect to the database and perform CRUD (create, read, update, delete) operations.

## 3.3 Accessing and Updating Health Information

## The personal health information app shall allow users to update their old health data, such as weight or blood pressure measurements.

## 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.

Your response should replace this.

### >>>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.

## 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.

Your response should replace this.

## 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

Diagram

Description automatically generated with medium confidence

### >>>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* \_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.

### 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. For space purpose, I will only put the CustomHealthData class code here. You can find the CommonHealthData class code in the code files. I didn’t need AI help to identify this.  
  
**package** PHI;

**import** java.util.Date;

**import** java.util.ArrayList;

**public** **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();

}

}

The code above Signifies the polymorphism(taking many forms). The CustomHealthData class is overriding the base class’s two methods. The two same methods were also overridden in the CommonHealthData class.

### >>>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 then also put a sysout statement to prove the downcasting worked.

(2) MY PROMPT SEQUENCE (ONLY)

[1] can you give me an example of where and how downcasting is or can be used in this project?

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

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

ArrayList<HealthData> healthDataList = new ArrayList<>();

// add some health data to the list including some instances of CommonHealthData

healthDataList.add(new CustomHealthData("Note 1", new Date(System.currentTimeMillis())));

healthDataList.add(new CommonHealthData("John Smith", new Date(System.currentTimeMillis()), "Blood Pressure", 120, 80, 24.5, 35, 70, 120, 60, 80, false));

healthDataList.add(new CustomHealthData("Note 2", new Date(System.currentTimeMillis())));

healthDataList.add(new CommonHealthData("Jane Doe", new Date(System.currentTimeMillis()), "Blood Pressure", 110, 70, 21.5, 45, 65, 140, 70, 90, true));

// extract all CommonHealthData objects from the list and call a specific method that only exists in CommonHealthData

for (HealthData healthData : healthDataList) {

if (healthData instanceof CommonHealthData) {

CommonHealthData commonHealthData = (CommonHealthData) healthData; // downcast to CommonHealthData

double bmi = commonHealthData.getBmi(); // access method specific to CommonHealthData

System.out.println("BMI for " + commonHealthData.getName() + " is " + bmi);

}

}

### 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. It might it change later,  
**public** **static** **void** main(String[] args) {

HealthData healthData = **new** CommonHealthData("John", **new** Date(System.*currentTimeMillis*()), "Blood pressure", 120, 80, 25.0, 35, 80.0, 130, 70, 60, **false**);

CustomHealthData customHealthData = **new** CustomHealthData("Sarah", **new** Date(System.*currentTimeMillis*()));

// downcast healthData to CommonHealthData

**if** (healthData **instanceof** CommonHealthData) {

CommonHealthData commonHealthData = (CommonHealthData) healthData;

System.***out***.println(commonHealthData.getMetric() + ": " + commonHealthData.getSystolicBP() + "/" + commonHealthData.getDiastolicBP());

}

// downcast healthData to CustomHealthData

**if** (healthData **instanceof** CustomHealthData) {

CustomHealthData customHealthData2 = (CustomHealthData) healthData;

customHealthData2.addNote("This is a custom note");

}

// downcast customHealthData to HealthData

HealthData healthData2 = (HealthData) customHealthData;

System.***out***.println("Name: " + healthData2.getName());

}

In this example, we create a HealthData object of type CommonHealthData and a CustomHealthData object. We then downcast the HealthData object to CommonHealthData and print out the blood pressure metric. We also try to downcast the HealthData object to CustomHealthData, but since it is not of that type, that code block is skipped. Finally, we downcast the CustomHealthData object to HealthData and print out the name.

### >>>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.

Your response should replace this.

### >>>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.

## 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)