



Lab 9 Blood Pressure Monitoring¹

Due: Tuesday, November 8, 2011 at 23:00

“One way to get high blood pressure is to go mountain climbing over molehills.”

1. Outcomes

1. Design simple Java programs to meet a given need.
2. Employ object oriented design and analysis
3. Design and construct a simple program to solve a real world problem.
4. Construct software which utilizes arrays to store a set of data

2. Introduction

High blood pressure affects 1 in 4 American adults. It is a leading cause of heart attacks and strokes, and contributes to serious complications during pregnancy. It can also indicate an increased risk Alzheimer disease.

Blood pressure is stored as two numbers. The top number, which is also the higher of the two numbers, measures the pressure in the arteries when the heart beats. This number, referred to as the systolic number, measures the pressure when the heart muscle contracts. The second number, or bottom number, measures the pressure in the arteries between heartbeats. This measurement, called the diastolic number, measures the pressure when the heart muscle is resting between beats and refilling with blood.

Normal blood pressure is defined as an average reading of less than 120 Systolic and less than 80 diastolic. Other conditions are defined based on the Table 1.

Category	Systolic Reading		Diastolic Reading
Normal	Less than 120	and	Less than 80
Pre-hypertension	120 - 139	or	80 - 89
Stage 1 Hypertension	140 - 159	or	90 - 99
Stage 2 Hypertension	160 or higher	or	100 or higher

Table 1: Blood pressure diagnosis

¹ Or Healthy Living 101



Hypertensive Crisis occurs if either then Systolic pressure is greater than 180 or the Diastolic pressure is greater than 110. Persons experiencing a Hypertensive Crisis should immediately seek medical attention.

3. Assignment

For this lab, you are to design and implement a program which will allow the user to enter 5 blood pressure readings, calculate the average of those readings, and determine if a person has normal blood pressure or one of the abnormal conditions described in the table.

4. Lab Details

The first step for this lab is to construct a UML class diagram showing the design. Overall, your program must contain a minimum of three classes (though you may use more if you feel it makes sense to do so). One class will contain the information about a blood pressure reading. The second class would contain a static method which manufactures an instance of a blood pressure reading. The third class contains the application specific code. This may include one or more helper methods and a main method.

4.1. Step 1: Draw a UML class diagram

The first step of this lab is to draw a UML class diagram. This class diagram should show all of the classes, the methods, each class has, as well as the parameters when the methods are invoked. Methods and attributes should be marked as public, private, and static as appropriate.

Your class diagram does not need to be electronically generated, but should be hand drawn in a neat fashion.

When you have completed your UML design, have your instructor review it before you start coding.

4.2. Step 2: Implement the Code

In step 2, implement the source code based on your UML design. Make certain that you pay attention to JavaDoc and other comments, as well as variable scopes and access modifiers. When everything is completed, your program should generate an output resembling that shown in the following section.

5. Sample Execution Traces

Here are a few samples of the program executing. Note that for space reasons, some of the traces have been shortened.

```
#####  
Enter blood pressure reading 1  
Enter the data and time of the reading.
```



```

January 1 11:00
Enter the systolic reading.
150
Enter the diastolic reading.
80
Enter blood pressure reading 2
Enter the data and time of the reading.
January 2 11:00
Enter the systolic reading.
165
Enter the diastolic reading.
108
Enter blood pressure reading 3
Enter the data and time of the reading.
January 3 11:00
Enter the systolic reading.
162
Enter the diastolic reading.
99
Enter blood pressure reading 4
Enter the data and time of the reading.
January 4 11:00
Enter the systolic reading.
140
Enter the diastolic reading.
72
Enter blood pressure reading 5
Enter the data and time of the reading.
January 5 11:00
Enter the systolic reading.
181
Enter the diastolic reading.
101
#####
January 1 11:00 150 over 80
January 2 11:00 165 over 108
January 3 11:00 162 over 99
January 4 11:00 140 over 72
January 5 11:00 181 over 101
Average: 159 over 92
In Hypertensive Crisis. Get to the hospital NOW
#####
.
.
.
#####
January 1 10:00 110 over 65
January 2 11:00 110 over 65
January 3 12:00 110 over 65
January 4 10:00 110 over 65
January 5 9:00 110 over 65
Average: 110 over 65
Your blood pressure is normal. Keep it up.
#####

```



```
#####  
. . .  
#####  
January 1 10:00 140 over 88  
January 2 10:00 140 over 87  
January 3 11:00 130 over 82  
January 4 11:00 131 over 83  
January 5 10:00 131 over 87  
Average: 134 over 85  
Pre-Hypertension is present. Watch your salt intake and be careful.  
#####
```

6. Deliverables

- 1) Initialed UML diagram. This should be submitted in hard copy by the end of class on Friday, November 4, 2011.
- 2) Lab report, submitted in pdf format through the course website. This report should include:
 - (a) Name, date, title, and course information.
 - (b) A short description of what you did in this lab.
 - (c) Samples of the program executing showing the output written to the console.
 - (d) A short description of what went wrong and what went right during the lab.
 - (e) A description of what you learned from this lab.
 - (f) The Java source code you wrote as an appendix.
- 3) Your source code for all java classes.
- 4) All deliverables are to be uploaded to the course website.