

# CS120 - Computer Science I

## Assignment #2

### Spring 2014

This program is due electronically on Monday, February 10, before midnight. Turnin this assignment by using the source file name `hw2.cpp` (note the filename, all lowercase must be used) and the command

```
cscheckin -f hw2.cpp -c cs120
```

Also, turn a hard-copy printout, formatted for readability, to your instructor by start of class Wednesday February 12. If you are having trouble indenting nicely, see the lecture notes section titled "Need Indentation Help?" for tips on using the `indent` program.

The purpose of this assignment is to use decision making statements (`if`, `if-else`, and/or `switch-case`) in a C++ program.

Avista Utilities provides electricity to this area. They use complicated formulas to determine the charges for their services. They also use different rate schedules for residential, commercial and industrial customers. Each schedule consists of one or more of the following charges:

- A basic charge - a charge that is levied whether the customer uses any power or not.
- An energy charge - the actual cost of the energy used. Energy is measured in kilowatt-hours (kWh), and the cost of the energy used is determined by multiplying the kWh by the cost per kWh. On the schedules, the amount per kWh varies, depending upon the total amount of energy used.
- A demand charge - a cost associated with the maximum peak rate of energy use, measured in kW. This charge is either a fixed amount or is determined by multiplying the kW rate by the demand charge per kW.
- A voltage discount - Some customers receive a discount on the demand portion of their bill, determined by multiplying the discount rate by the demand amount.

Not every type of customer pays every type of charge. The type of customer is determined by a *schedule* number. The list on the next page summarizes each type of customer and the charges that are pertinent to that customer.

For this assignment, you are write a program that will input a customer number (up to 6 digits), a schedule number (the legal values are 1, 11, 12, 21 and 25), and then only the information about that customer that is relevant to compute the bill for that type of customer. All customers will have an energy use (kWh) - this is the only information required for schedule 1 customers. Other customers will have a demand amount (kW), and schedule 21 and 25 customers will need to have an indication (Y - for yes, N - for no) whether they should receive a voltage discount. Your program should then output the customer number, all the parameters that were input, and the computed electricity bill.

Test your program for several different customer types - enough to show that it computes the bill properly for each type of customer, and each scenario.

The current rate schedule is shown below. A couple of sample runs (along with some hints at the calculations involved in each example) are also shown.

Schedule 1 - Residential	Rate
Basic charge	\$ 5.25000
Energy charge - first 600 kWh (per kWh)	0.07903
Energy charge - over 600 kWh (per kWh)	0.08853
Demand charge	None
Schedule 11 - Small commercial	Rate
Basic charge	\$10.00000
Energy charge - first 3650 kWh (per kWh)	0.09662
Energy charge - over 3650 kWh (per kWh)	0.07206
Demand charge - up to 20 kW	0.00000
Demand charge - more than 20 kW (per kW above 20kW)	5.25000
Voltage discount	None
Schedule 12 - Large commercial - same as Schedule 11	
Schedule 21 - Industrial	Rate
Basic charge	\$ None
Energy charge - first 250000 kWh (per kWh)	0.06263
Energy charge - over 250000 kWh (per kWh)	0.05339
Demand charge - up to 50 kW (fixed charge)	350.00000
Demand charge - over 50 kW (per kW above 50kW)	4.75000
Voltage discount (if eligible - per kW of demand)	0.20000
Schedule 25 - Large Industrial	Rate
Basic charge	\$ None
Energy charge - first 500000 kWh (per kWh)	0.05111
Energy charge - over 500000 kWh (per kWh)	0.04313
Demand charge - first 3000 kW (fixed charge)	12500.00
Demand charge - over 3000 kW (per kW above 3000 kW)	4.5000
Voltage discount (if eligible - per kW of demand)	0.20000

### Sample Run #1:

Enter your Customer Number: 123456  
 Enter your Schedule Number: 1  
 Enter your Energy Use (kWh): 700  
 Customer Number: 123456, based on your Schedule Number 1  
 and Energy Use of 700kWh, your total charge is \$61.521

*\*Hint:  $5.25 + (.07903 * 600) + (.08853 * 100)$*

### Sample Run #2:

Enter your Customer Number: 321456  
 Enter your Schedule Number: 21  
 Enter your Energy Use (kWh): 300000  
 Enter your Demand Amount (kW): 100  
 Are you eligible for a Voltage Discount? (y/n) y  
 Customer Number: 321456, based on your Schedule Number 21  
 Energy Use of 300000kWh, and Demand Amount of 100kW with  
 a Voltage Discount, your total charge is \$18894.50

*\*Hint:  $(.06263 * 250000) + (.05339 * 50000) + 350 + (4.75 * 50) - (0.2 * 100)$*