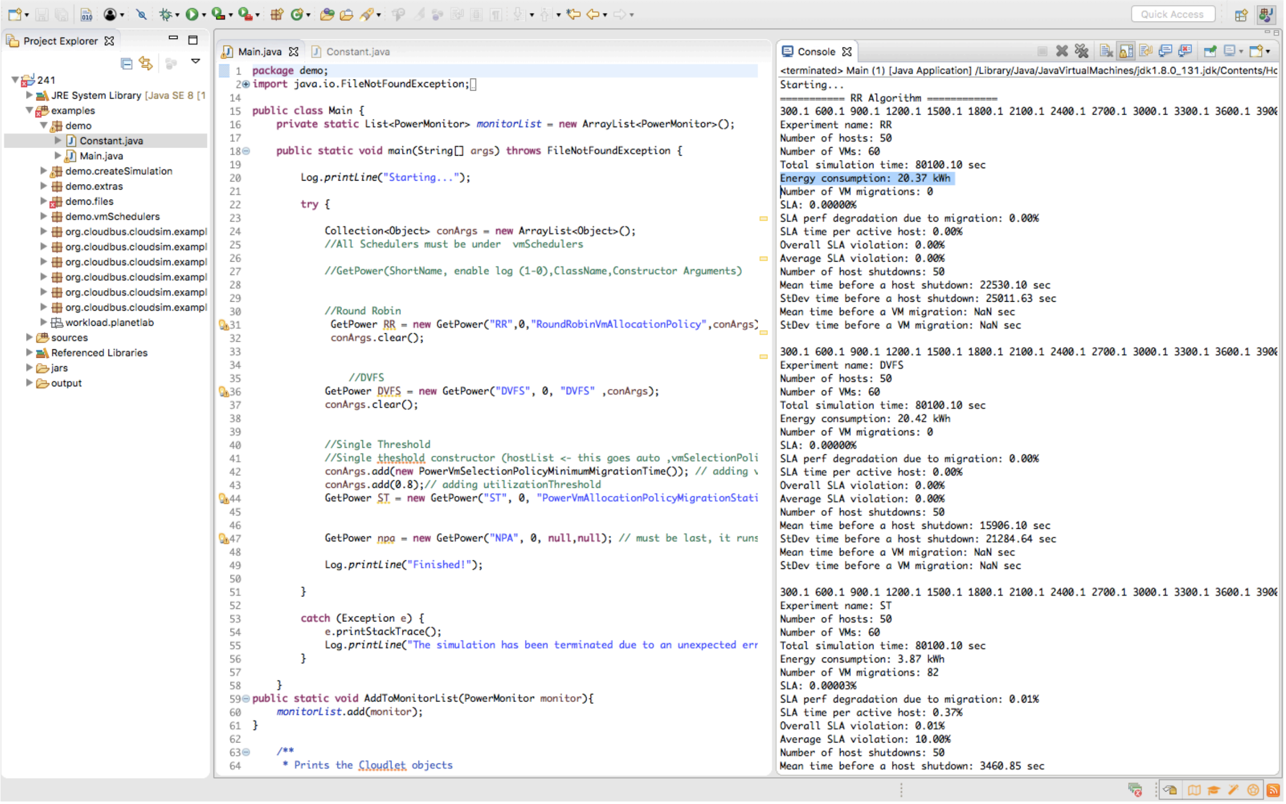
Simulation and Results

1. Run 60 VMs, get the energy consumption from each allocation policy.



```java
package demo;
import java.io.FileNotFoundException;

public class Main {
    private static List<PowerMonitor> monitorList = new ArrayList<PowerMonitor>();

    public static void main(String[] args) throws FileNotFoundException {

        Log.printLine("Starting...");

        try {

            Collection<Object> conArgs = new ArrayList<Object>();
            //All Schedulers must be under  vmSchedulers

            //GetPower(ShortName, enable log (1-0),ClassName,Constructor Arguments)


            //Round Robin
             GetPower RR = new GetPower("RR",0,"RoundRobinVmAllocationPolicy",conArgs)
             conArgs.clear();


                //DVFS
            GetPower DVFS = new GetPower("DVFS", 0, "DVFS" ,conArgs);
            conArgs.clear();


            //Single Threshold
            //Single theshold constructor (hostList <- this goes auto ,vmSelectionPoli
            conArgs.add(new PowerVmSelectionPolicyMinimumMigrationTime()); // adding v
            conArgs.add(0.8);// adding utilizationThreshold
            GetPower ST = new GetPower("ST", 0, "PowerVmAllocationPolicyMigrationStati


            GetPower npa = new GetPower("NPA", 0, null,null); // must be last, it runs

            Log.printLine("Finished!");

        }

        catch (Exception e) {
            e.printStackTrace();
            Log.printLine("The simulation has been terminated due to an unexpected err
        }

    }
public static void AddToMonitorList(PowerMonitor monitor){
    monitorList.add(monitor);
}

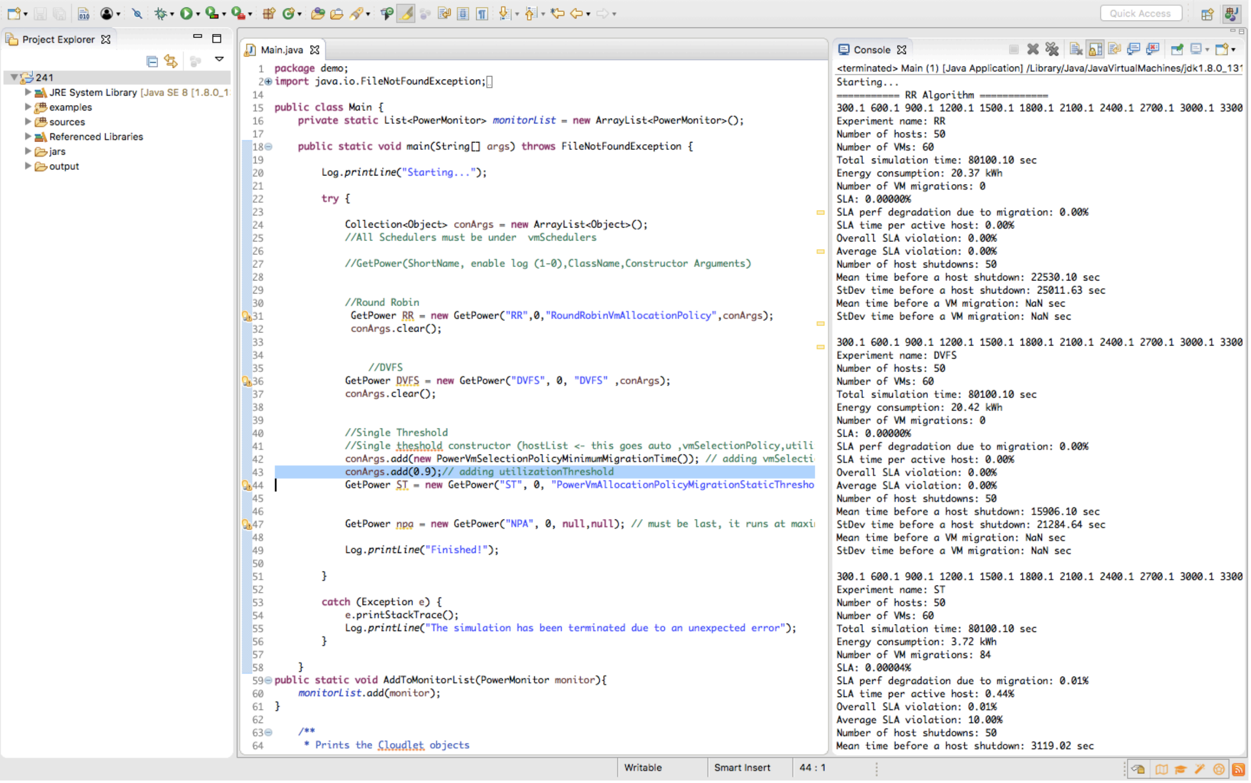
    /**
     * Prints the Cloudlet objects
```

```
<terminated> Main (1) [Java Application] /Library/Java/JavaVirtualMachines/jdk1.8.0_131.jdk/Contents/Hc
Starting...
=========== RR Algorithm ============
300.1 600.1 900.1 1200.1 1500.1 1800.1 2100.1 2400.1 2700.1 3000.1 3300.1 3600.1 390
Experiment name: RR
Number of hosts: 50
Number of VMs: 60
Total simulation time: 80100.10 sec
Energy consumption: 20.37 kWh
Number of VM migrations: 0
SLA: 0.00000%
SLA perf degradation due to migration: 0.00%
SLA time per active host: 0.00%
Overall SLA violation: 0.00%
Average SLA violation: 0.00%
Number of host shutdowns: 50
Mean time before a host shutdown: 22530.10 sec
StDev time before a host shutdown: 25011.63 sec
Mean time before a VM migration: NaN sec
StDev time before a VM migration: NaN sec

300.1 600.1 900.1 1200.1 1500.1 1800.1 2100.1 2400.1 2700.1 3000.1 3300.1 3600.1 390
Experiment name: DVFS
Number of hosts: 50
Number of VMs: 60
Total simulation time: 80100.10 sec
Energy consumption: 20.42 kWh
Number of VM migrations: 0
SLA: 0.00000%
SLA perf degradation due to migration: 0.00%
SLA time per active host: 0.00%
Overall SLA violation: 0.00%
Average SLA violation: 0.00%
Number of host shutdowns: 50
Mean time before a host shutdown: 15906.10 sec
StDev time before a host shutdown: 21284.64 sec
Mean time before a VM migration: NaN sec
StDev time before a VM migration: NaN sec

300.1 600.1 900.1 1200.1 1500.1 1800.1 2100.1 2400.1 2700.1 3000.1 3300.1 3600.1 390
Experiment name: ST
Number of hosts: 50
Number of VMs: 60
Total simulation time: 80100.10 sec
Energy consumption: 3.87 kWh
Number of VM migrations: 82
SLA: 0.00003%
SLA perf degradation due to migration: 0.01%
SLA time per active host: 0.37%
Overall SLA violation: 0.01%
Average SLA violation: 10.00%
Number of host shutdowns: 50
Mean time before a host shutdown: 3460.85 sec
```

2. Change the utilization of STH from 0.5 to 0.9, get the different energy consumption/SLA violation/VM migration number for each allocation policy.



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            //Single Threshold
            //Single theshold constructor (hostList <- this goes auto ,vmSelectionPolicy,utili
            conArgs.add(new PowerVmSelectionPolicyMinimumMigrationTime()); // adding vmSelecti
            conArgs.add(0.9);// adding utilizationThreshold
            GetPower ST = new GetPower("ST", 0, "PowerVmAllocationPolicyMigrationStaticThresho


            GetPower npa = new GetPower("NPA", 0, null,null); // must be last, it runs at maxi

            Log.printLine("Finished!");

        }

        catch (Exception e) {
            e.printStackTrace();
            Log.printLine("The simulation has been terminated due to an unexpected error");
        }

    }
public static void AddToMonitorList(PowerMonitor monitor){
    monitorList.add(monitor);
}

    /**
     * Prints the Cloudlet objects
```

```
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Starting...
=========== RR Algorithm ============
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Experiment name: RR
Number of hosts: 50
Number of VMs: 60
Total simulation time: 80100.10 sec
Energy consumption: 20.37 kWh
Number of VM migrations: 0
SLA: 0.00000%
SLA perf degradation due to migration: 0.00%
SLA time per active host: 0.00%
Overall SLA violation: 0.00%
Average SLA violation: 0.00%
Number of host shutdowns: 50
Mean time before a host shutdown: 22530.10 sec
StDev time before a host shutdown: 25011.63 sec
Mean time before a VM migration: NaN sec
StDev time before a VM migration: NaN sec

300.1 600.1 900.1 1200.1 1500.1 1800.1 2100.1 2400.1 2700.1 3000.1 3300
Experiment name: DVFS
Number of hosts: 50
Number of VMs: 60
Total simulation time: 80100.10 sec
Energy consumption: 20.42 kWh
Number of VM migrations: 0
SLA: 0.00000%
SLA perf degradation due to migration: 0.00%
SLA time per active host: 0.00%
Overall SLA violation: 0.00%
Average SLA violation: 0.00%
Number of host shutdowns: 50
Mean time before a host shutdown: 15906.10 sec
StDev time before a host shutdown: 21284.64 sec
Mean time before a VM migration: NaN sec
StDev time before a VM migration: NaN sec

300.1 600.1 900.1 1200.1 1500.1 1800.1 2100.1 2400.1 2700.1 3000.1 3300
Experiment name: ST
Number of hosts: 50
Number of VMs: 60
Total simulation time: 80100.10 sec
Energy consumption: 3.72 kWh
Number of VM migrations: 84
SLA: 0.00004%
SLA perf degradation due to migration: 0.01%
SLA time per active host: 0.44%
Overall SLA violation: 0.01%
Average SLA violation: 10.00%
Number of host shutdowns: 50
Mean time before a host shutdown: 3119.02 sec
```