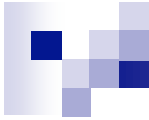




Finite State Machine Code Generation



Goal

- Generating java code from finite state machine specification by using dynamic script language called POET to improve the performance.
- Final code generation can be performed for each language of interest by defining code template.
- Here I have used code templates called *JavaFront.code* and *statemachine.code* to generate java code from finite state machine specification.



Algorithm

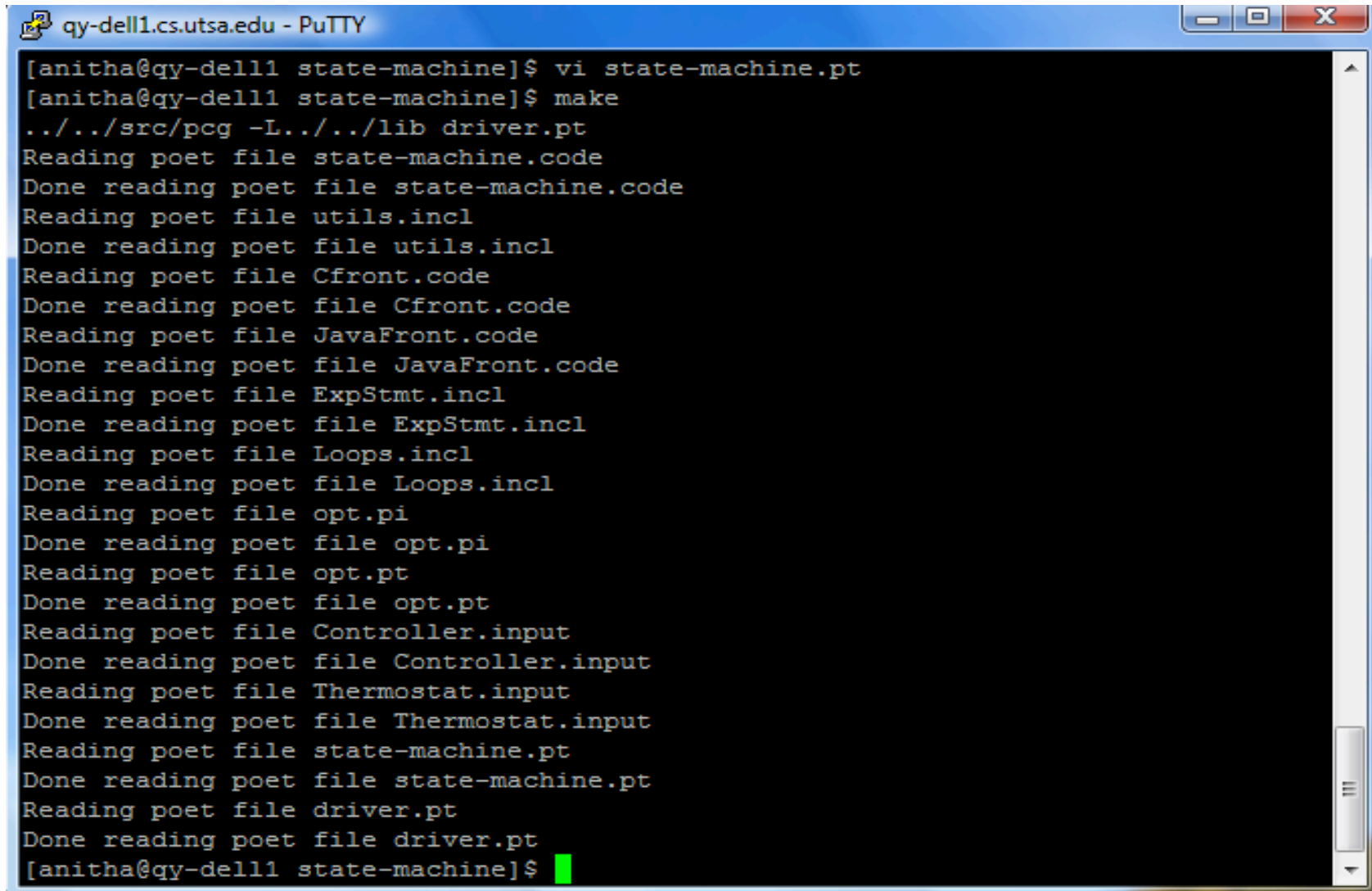
- *Translate Machine Algorithm*
Input : Finite State Machine Specification
Output: Generated Java code
- *Input Specification:*
Controller State Machine
Thermostat State Machine
- *Output files:*
Controller.java
Thermostat.java
EventHandling.java



State Machine

- *Transitions*
 - States
 - Source state
 - Destination State
 - Triggering Events
 - Conditions
 - Actions
 - Autonomous Transitions

Compiling the Program

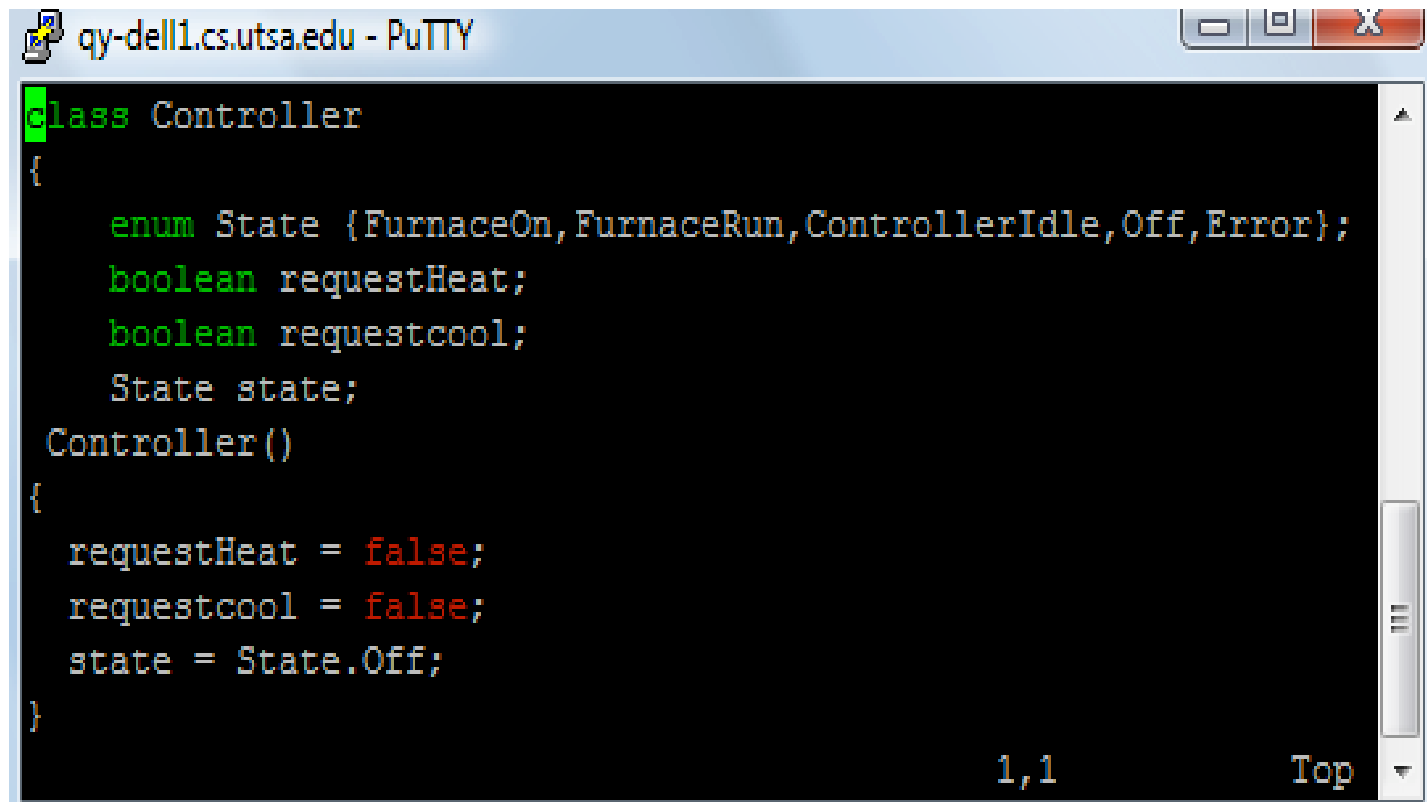


```
qy-dell1.cs.utsa.edu - PuTTY
[anitha@qy-dell1 state-machine]$ vi state-machine.pt
[anitha@qy-dell1 state-machine]$ make
../../src/pcg -L../../lib driver.pt
Reading poet file state-machine.code
Done reading poet file state-machine.code
Reading poet file utils.incl
Done reading poet file utils.incl
Reading poet file Cfront.code
Done reading poet file Cfront.code
Reading poet file JavaFront.code
Done reading poet file JavaFront.code
Reading poet file ExpStmt.incl
Done reading poet file ExpStmt.incl
Reading poet file Loops.incl
Done reading poet file Loops.incl
Reading poet file opt.pi
Done reading poet file opt.pi
Reading poet file opt.pt
Done reading poet file opt.pt
Reading poet file Controller.input
Done reading poet file Controller.input
Reading poet file Thermostat.input
Done reading poet file Thermostat.input
Reading poet file state-machine.pt
Done reading poet file state-machine.pt
Reading poet file driver.pt
Done reading poet file driver.pt
[anitha@qy-dell1 state-machine]$
```

Generating java code

Creating java class

Collect all the basic states

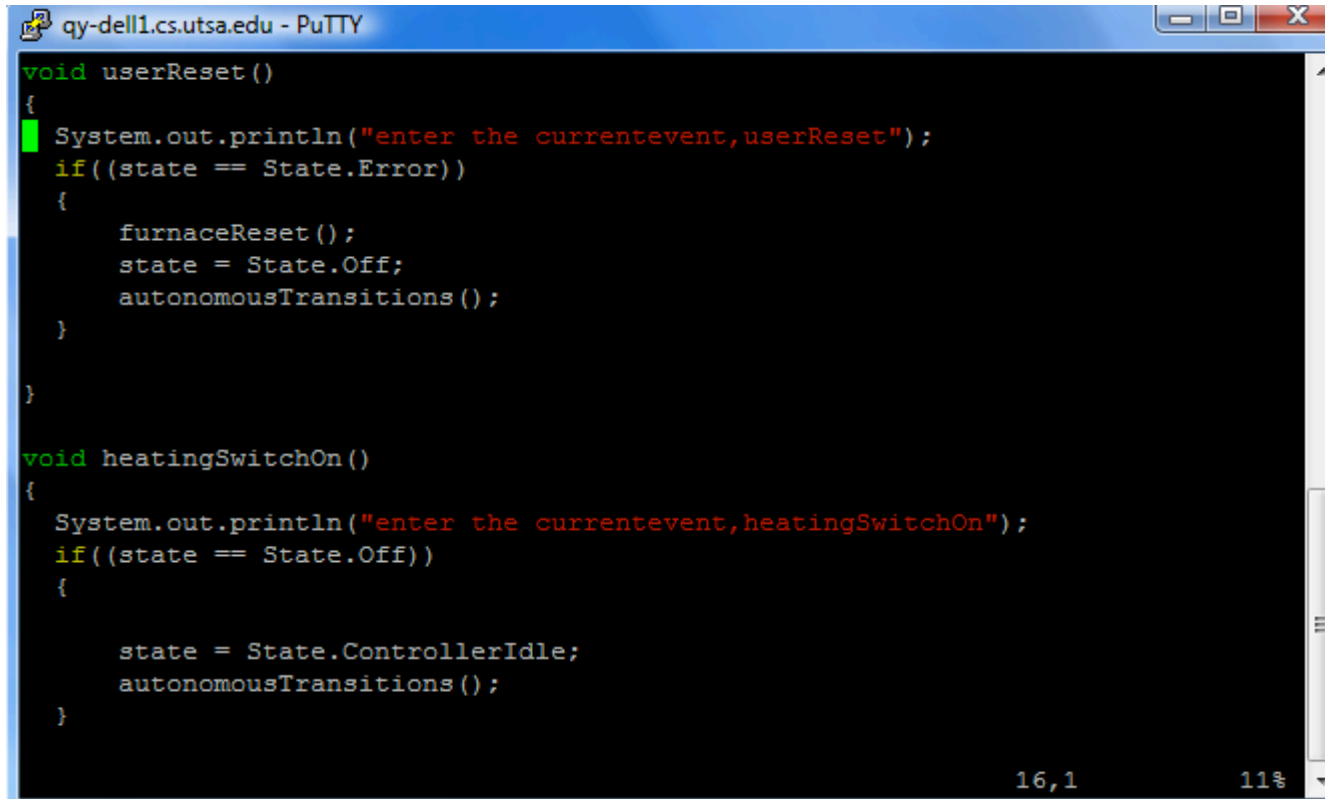


```
qy-dell1.cs.utsa.edu - PuTTY
class Controller
{
    enum State {FurnaceOn,FurnaceRun,ControllerIdle,Off,Error};
    boolean requestHeat;
    boolean requestcool;
    State state;
    Controller()
    {
        requestHeat = false;
        requestcool = false;
        state = State.Off;
    }
}
```

1,1 Top

Translating Triggering Events

Collect all the events and create a member function for each event

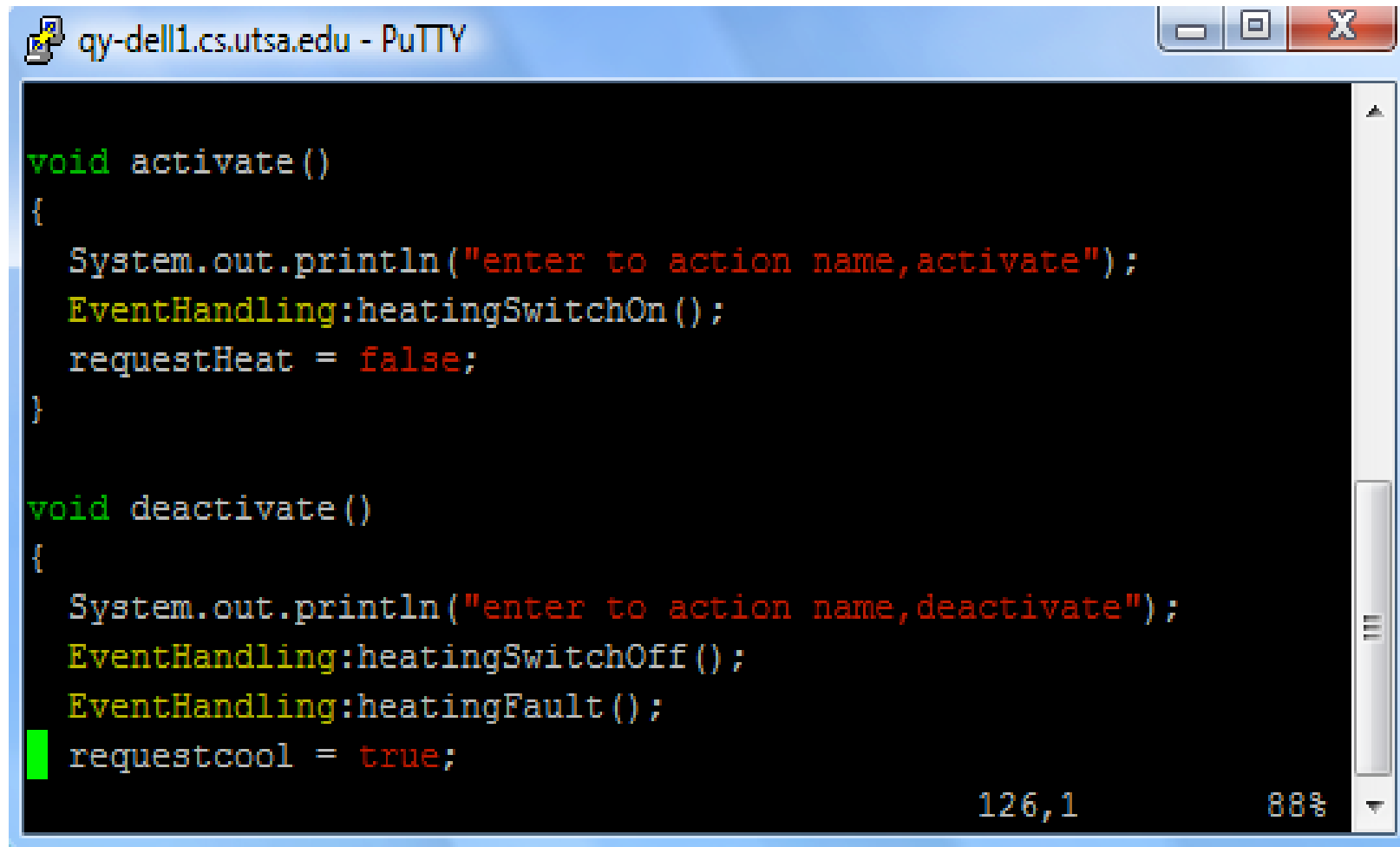


```
qy-dell1.cs.utsa.edu - PuTTY
void userReset ()
{
    System.out.println("enter the currentevent,userReset");
    if((state == State.Error))
    {
        furnaceReset ();
        state = State.Off;
        autonomousTransitions ();
    }
}

void heatingSwitchOn ()
{
    System.out.println("enter the currentevent,heatingSwitchOn");
    if((state == State.Off))
    {
        state = State.ControllerIdle;
        autonomousTransitions ();
    }
}
```

16,1 11%

Translating Actions



```
qy-dell1.cs.utsa.edu - PuTTY

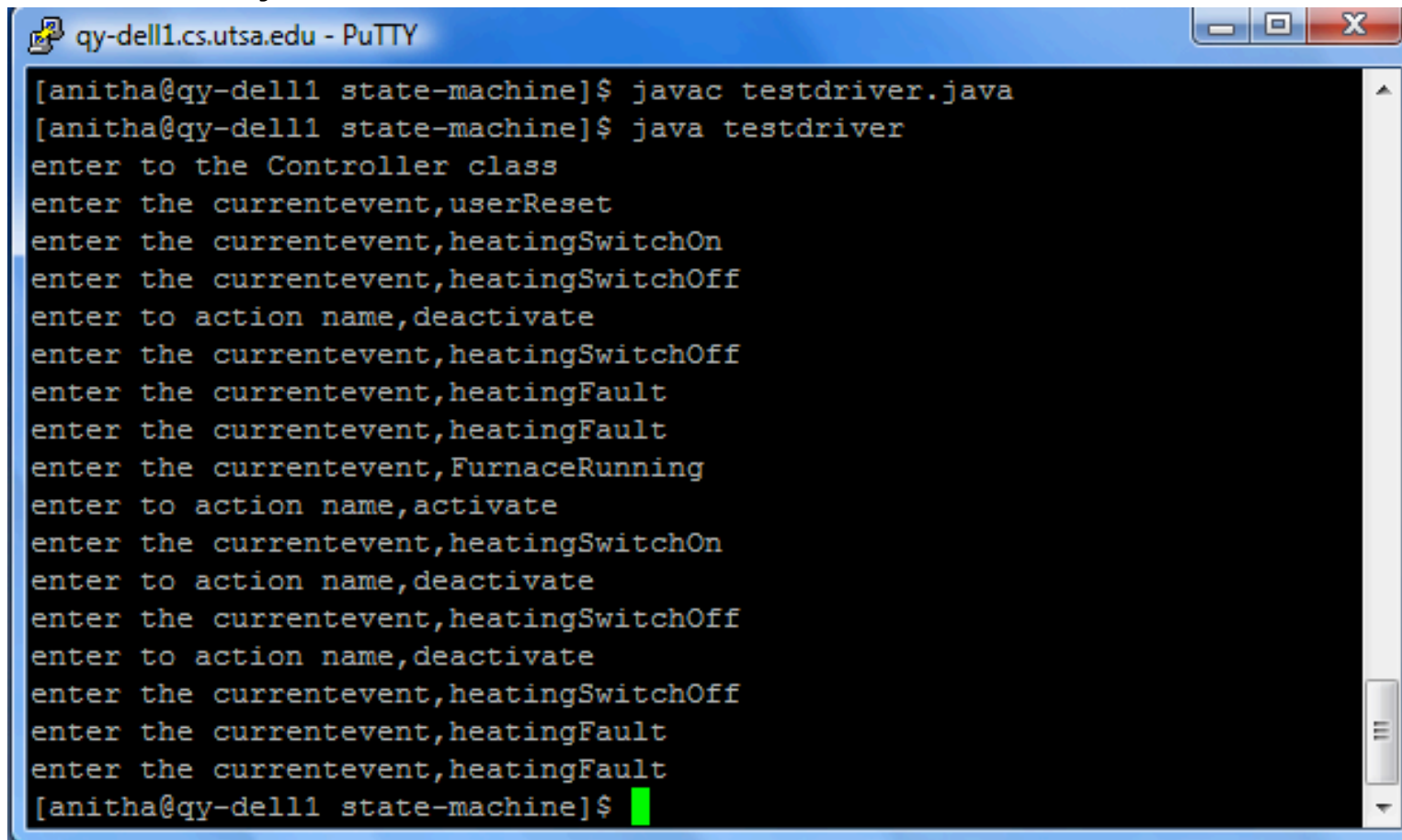
void activate()
{
    System.out.println("enter to action name,activate");
    EventHandler:heatingSwitchOn();
    requestHeat = false;
}

void deactivate()
{
    System.out.println("enter to action name,deactivate");
    EventHandler:heatingSwitchOff();
    EventHandler:heatingFault();
    requestcool = true;
}

126,1      88%
```

Results for Running Controller.java

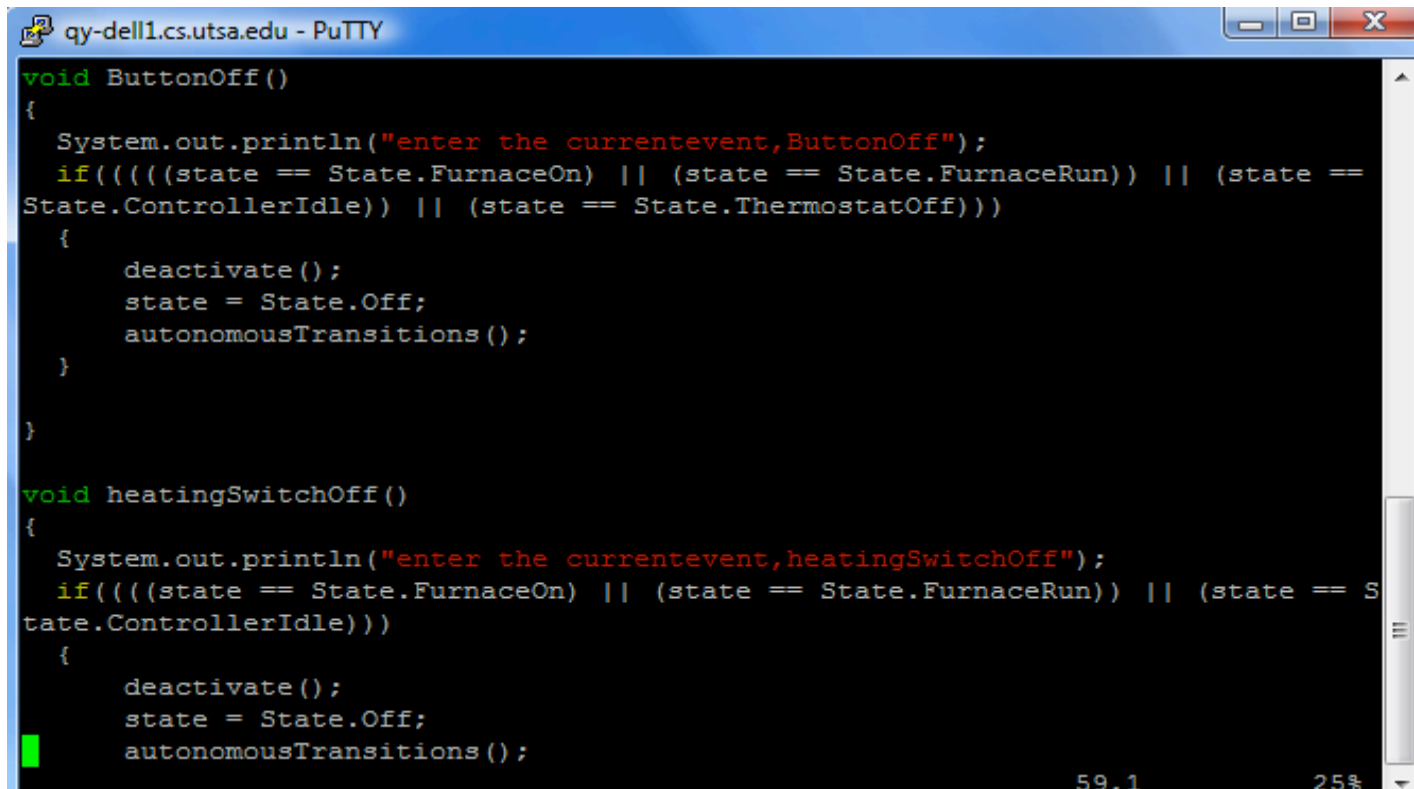
➤ testdriver.java



```
qy-dell1.cs.utsa.edu - PuTTY
[anitha@qy-dell1 state-machine]$ javac testdriver.java
[anitha@qy-dell1 state-machine]$ java testdriver
enter to the Controller class
enter the currentevent,userReset
enter the currentevent,heatingSwitchOn
enter the currentevent,heatingSwitchOff
enter to action name,deactivate
enter the currentevent,heatingSwitchOff
enter the currentevent,heatingFault
enter the currentevent,heatingFault
enter the currentevent,FurnaceRunning
enter to action name,activate
enter the currentevent,heatingSwitchOn
enter to action name,deactivate
enter the currentevent,heatingSwitchOff
enter to action name,deactivate
enter the currentevent,heatingSwitchOff
enter the currentevent,heatingFault
enter the currentevent,heatingFault
[anitha@qy-dell1 state-machine]$
```

Multiple State Machines

➤ Thermostat.java

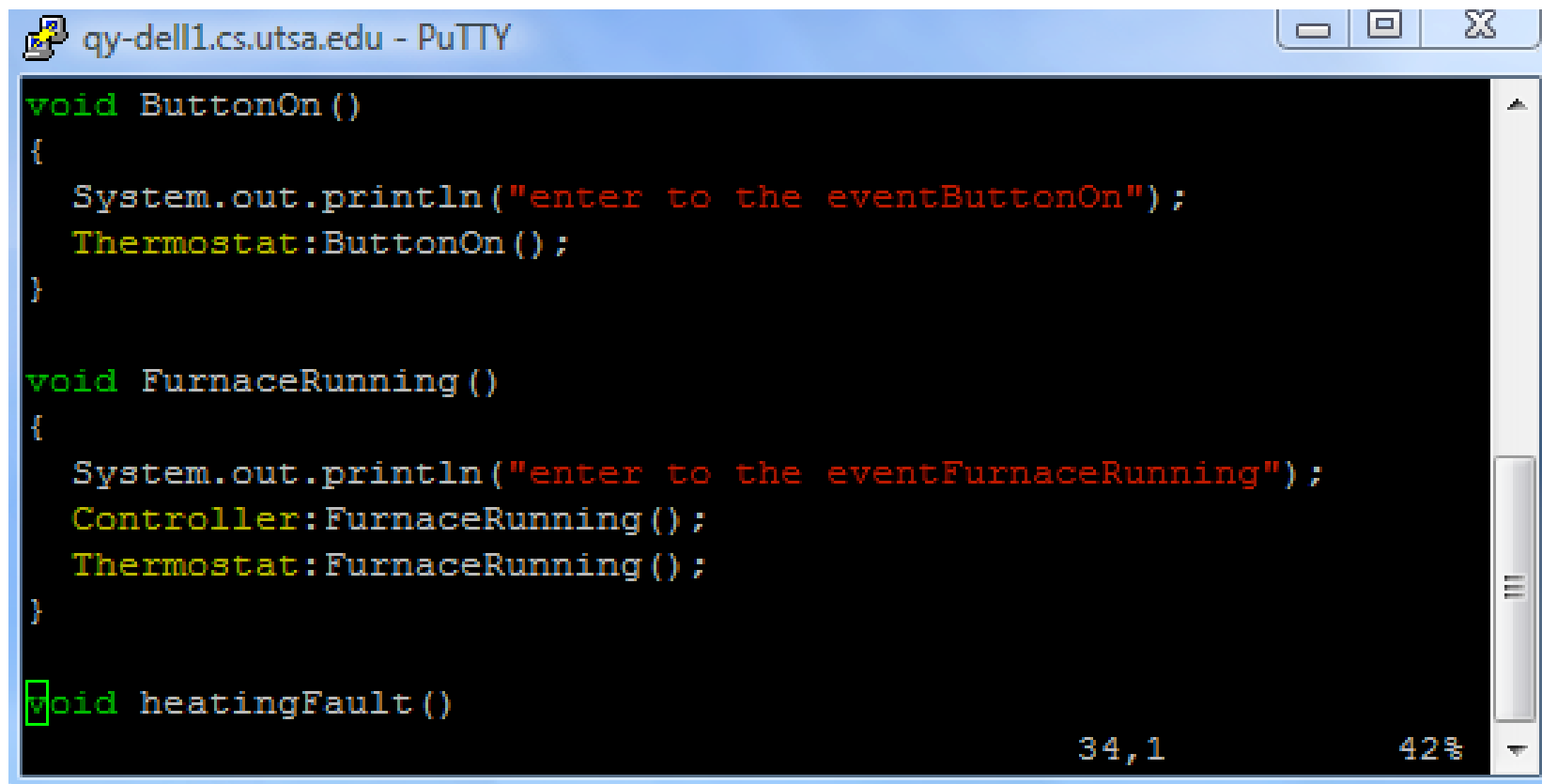


```
qy-dell1.cs.utsa.edu - PuTTY
void ButtonOff()
{
    System.out.println("enter the currentevent,ButtonOff");
    if((((state == State.FurnaceOn) || (state == State.FurnaceRun)) || (state ==
State.ControllerIdle)) || (state == State.ThermostatOff))
    {
        deactivate();
        state = State.Off;
        autonomousTransitions();
    }
}

void heatingSwitchOff()
{
    System.out.println("enter the currentevent,heatingSwitchOff");
    if((((state == State.FurnaceOn) || (state == State.FurnaceRun)) || (state == S
tate.ControllerIdle))
    {
        deactivate();
        state = State.Off;
        autonomousTransitions();
    }
}
```

Multiple State Machines

EventHandling.java



```
qy-dell1.cs.utsa.edu - PuTTY
void ButtonOn ()
{
    System.out.println("enter to the eventButtonOn");
    Thermostat:ButtonOn ();
}

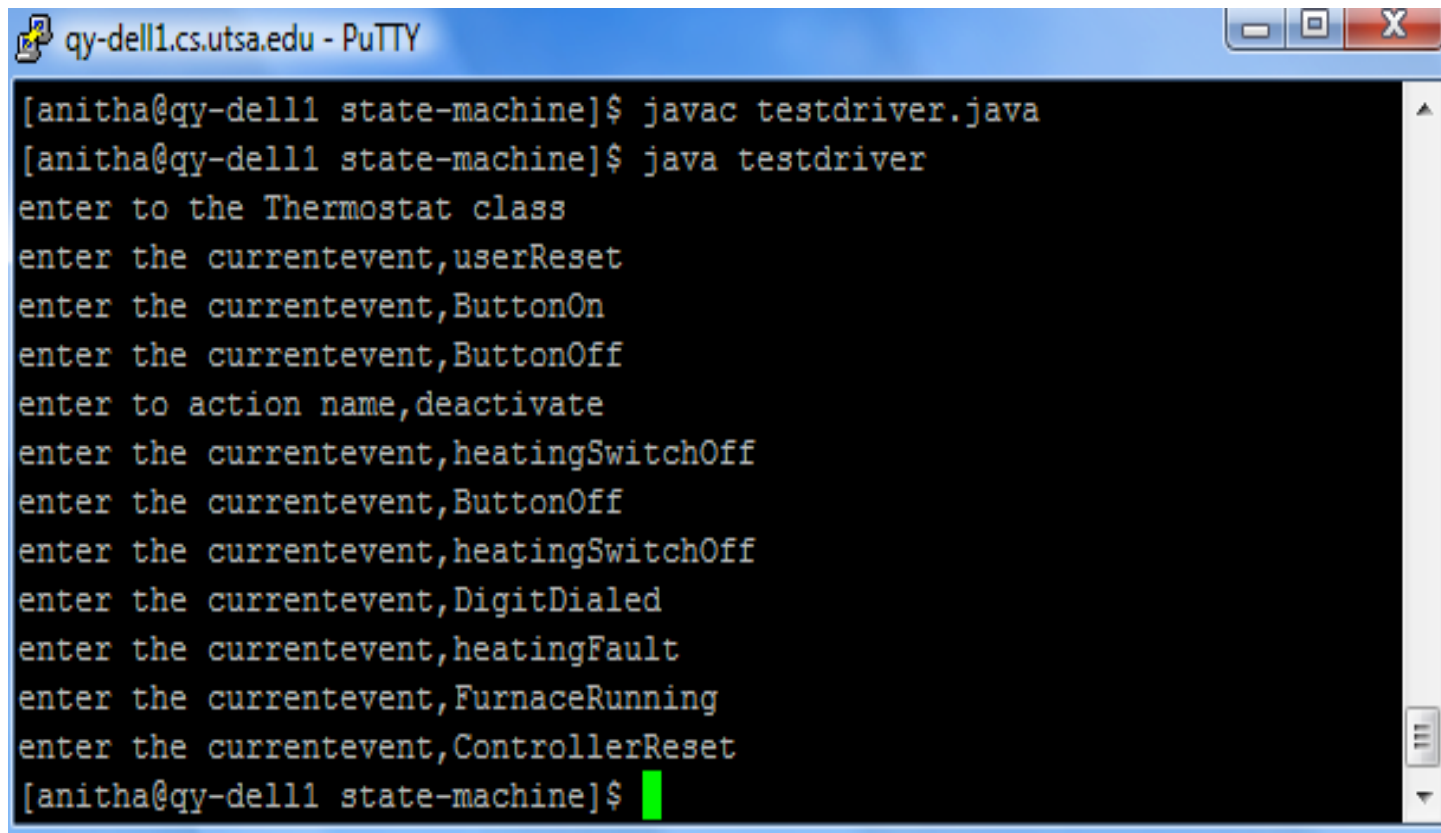
void FurnaceRunning ()
{
    System.out.println("enter to the eventFurnaceRunning");
    Controller:FurnaceRunning ();
    Thermostat:FurnaceRunning ();
}

void heatingFault ()
```

34,1 42%

Results for Running Thermostat.java

➤ testdriver.java



```
qy-dell1.cs.utsa.edu - PuTTY
[anitha@qy-dell1 state-machine]$ javac testdriver.java
[anitha@qy-dell1 state-machine]$ java testdriver
enter to the Thermostat class
enter the currentevent,userReset
enter the currentevent,ButtonOn
enter the currentevent,ButtonOff
enter to action name,deactivate
enter the currentevent,heatingSwitchOff
enter the currentevent,ButtonOff
enter the currentevent,heatingSwitchOff
enter the currentevent,DigitDialed
enter the currentevent,heatingFault
enter the currentevent,FurnaceRunning
enter the currentevent,ControllerReset
[anitha@qy-dell1 state-machine]$
```



Conclusion

- The generated java code from finite state machine specification is compiled and run successfully.
- Going to extend this by generating code in C++ and by evaluating this work in future.