NPC centralized control – Behavior Trees / AI

"Tick and Think"

SERVER SIDE (partial):

```
public class NPCcontroller
{
 BehaviorTree bt = new BehaviorTree(BTCompositeType.SELECTOR);
 . . .
 public void start ()
 { thinkStartTime = System.nanoTime();
  tickStateTime = System.nanoTime();
  lastThinkUpdateTime = thinkStartTime;
  lastTickUpdateTime = tickStartTime;
  setupNPC();
  setupBehaviorTree();
  npcLoop();
 }
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 public void setupNPC()
 {  npc = new NPC();
   npc.randomizeLocation(rn.nextInt(50),rn.nextInt(50));
 }
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 public void npcLoop()
 {  while (true)
  { long currentTime = System.nanoTime();
    float elapsedThinkMilliSecs = (currentTime-lastThinkUpdateTime)/(1000000.0f);
    float elapsedTickMilliSecs = (currentTime-lastTickUpdateTime)/(1000000.0f);

    if (elapsedTickMilliSecs >= 50.0f)             // "TICK"
    {    lastTickUpdateTime = currentTime;
         npc.updateLocation();
         server.sendNPCinfo();
    }

    if (elapsedThinkMilliSecs >= 500.0f)           // "THINK"
    {    lastThinkUpdateTime = currentTime;
         bt.update(elapsedMilliSecs);
    }
    Thread.yield();
 } }
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 public void setupBehaviorTree()
 { bt.insertAtRoot(new BTSequence(10));
  bt.insertAtRoot(new BTSequence(20));
  bt.insert(10, new OneSecPassed(this,npc,false));
  bt.insert(10, new GetSmall(npc));
  bt.insert(20, new AvatarNear(server,this,npc,false));
  bt.insert(20, new GetBig(npc));
} }
```
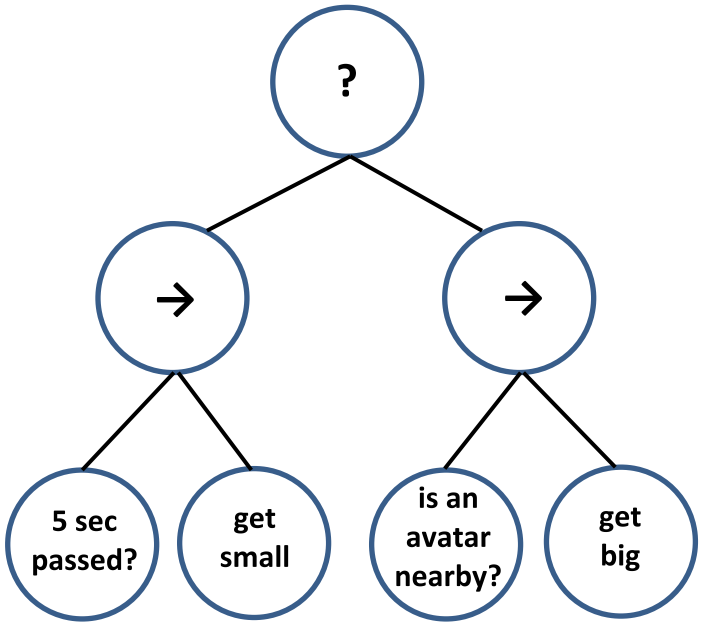

```
public class AvatarNear extends BTCondition
{
 public AvatarNear(GameServerTCP s, NPCcontroller c, NPC n, boolean toNegate)
 { super(toNegate);
  server = s;
  npcc = c;
  npc = n;
 }

 protected boolean check()
 { server.sendCheckForAvatarNear();
  return npcc.getNearFlag();
} }
```

```
public class GetSmall extends BTAction
{
 public GetSmall(NPC n)  { npc = n; }

 protected BTStatus update(float elapsedTime)
 { npc.getSmall();
  return BTStatus.BH_SUCCESS;
} }
```

```
public class GetBig extends BTAction
{
 public GetBig(NPC n)  { npc = n; }

 protected BTStatus update(float elapsedTime)
 { npc.getBig();
  return BTStatus.BH_SUCCESS;
} }
```

```
public class OneSecPassed extends BTCondition
{
 public OneSecPassed(NPCcontroller c, NPC n, boolean toNegate)
 { super(toNegate);
  npcc = c;
  npc = n;
  lastUpdateTime = System.nanoTime();
 }

 protected boolean check()
 { float elapsedMilliSecs = (System.nanoTime()-lastUpdateTime)/(1000000.0f);
  if ((elapsedMilliSecs >= 1000.0f) && (npc.getSize()==2.0))
  { lastUpdateTime = System.nanoTime();
   npcc.setNearFlag(false);
   return true;
  }
  else return false;
} }
```


?
→
→
5 sec passed?
get small
is an avatar nearby?
get big