Generating Filmstrip Models from Actor-Based Systems

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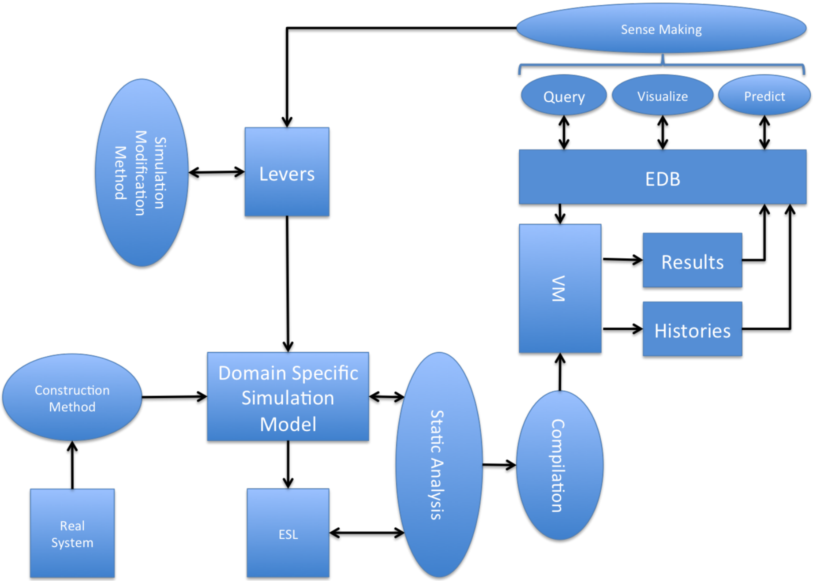
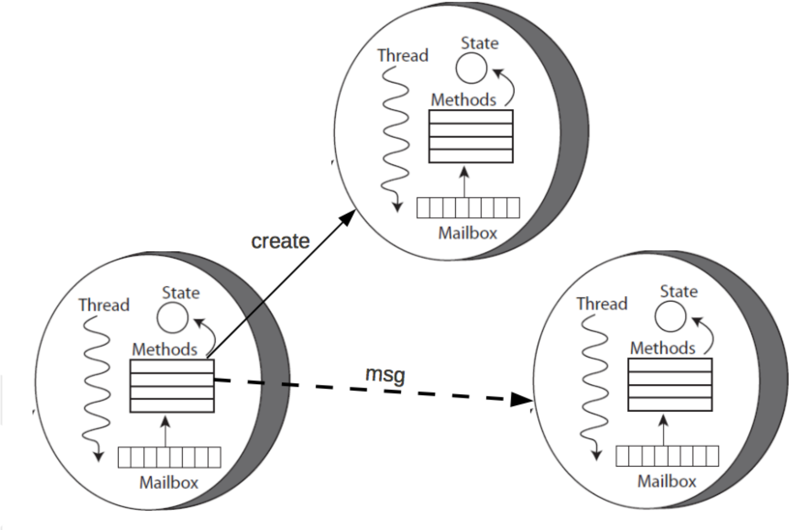
ESL Architecture



Actors


Thread
State
Methods
Mailbox
create
msg
Thread
State
Methods
Mailbox
Thread
State
Methods
Mailbox

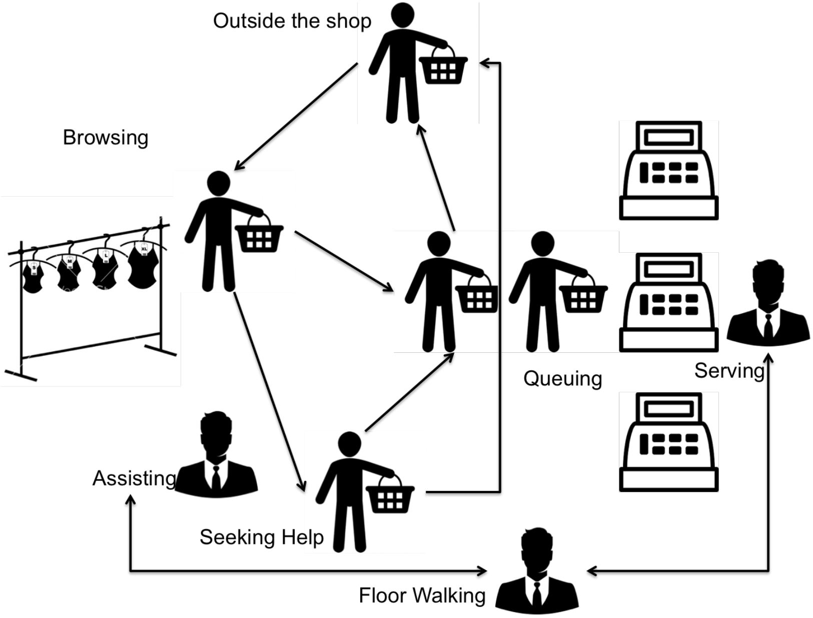
Hello World: Definition

```
export main;

type Main   = Act { Time(Int) };
type Worker = Act { Work() };

act worker(id::Int)::Worker {
  Work → {
    print[Str]('Hello World: ' + id);
    wait(random(10))
  }
};

range::[Int]        = 0..10;
workers::[Worker] = [new worker(i) | i::Int ← range];
limit::Int          = 100;

act main::Main {
  Time(n::Int) when n < limit → {
    for w::Worker in workers do {
      w ← Work
    }
  };
  Time(n::Int) → stopAll()
}
```

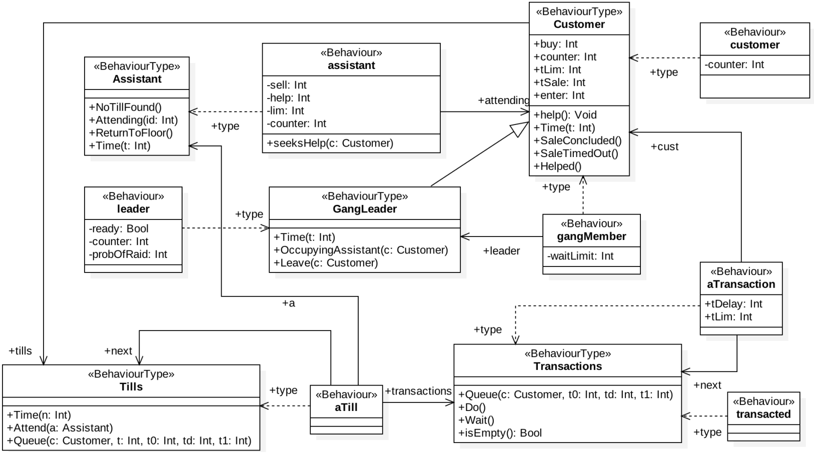
Hello World: Output

```
Hello World: 0
Hello World: 7
Hello World: 2
Hello World: 10
Hello World: 3
Hello World: 8
Hello World: 9
Hello World: 5
Hello World: 6
Hello World: 4
Hello World: 1
Hello World: 10
Hello World: 4
Hello World: 5
Hello World: 4
Hello World: 8
Hello World: 3
Hello World: 7
Hello World: 9
Hello World: 2
```

Shop


Outside the shop
Browsing
S
M
L
XL
Queuing
Serving
Assisting
Seeking Help
Floor Walking

Structure



«BehaviourType»
Customer
+buy: Int
+counter: Int
+tLim: Int
+tSale: Int
+enter: Int
+help(): Void
+Time(t: Int)
+SaleConcluded()
+SaleTimedOut()
+Helped()

«Behaviour»
customer
-counter: Int

«BehaviourType»
Assistant
+NoTillFound()
+Attending(id: Int)
+ReturnToFloor()
+Time(t: Int)

«Behaviour»
assistant
-sell: Int
-help: Int
-lim: Int
-counter: Int
+seeksHelp(c: Customer)

«Behaviour»
leader
-ready: Bool
-counter: Int
-probOfRaid: Int

«BehaviourType»
GangLeader
+Time(t: Int)
+OccupyingAssistant(c: Customer)
+Leave(c: Customer)

«Behaviour»
gangMember
-waitLimit: Int

«Behaviour»
aTransaction
+tDelay: Int
+tLim: Int

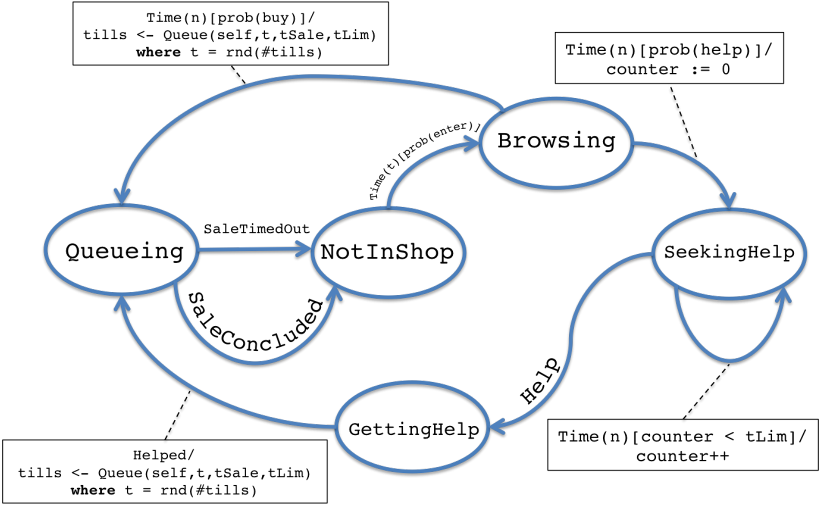
«BehaviourType»
Tills
+Time(n: Int)
+Attend(a: Assistant)
+Queue(c: Customer, t: Int, t0: Int, td: Int, t1: Int)

«Behaviour»
aTill

«BehaviourType»
Transactions
+Queue(c: Customer, t0: Int, td: Int, t1: Int)
+Do()
+Wait()
+isEmpty(): Bool

«Behaviour»
transacted

Behaviour



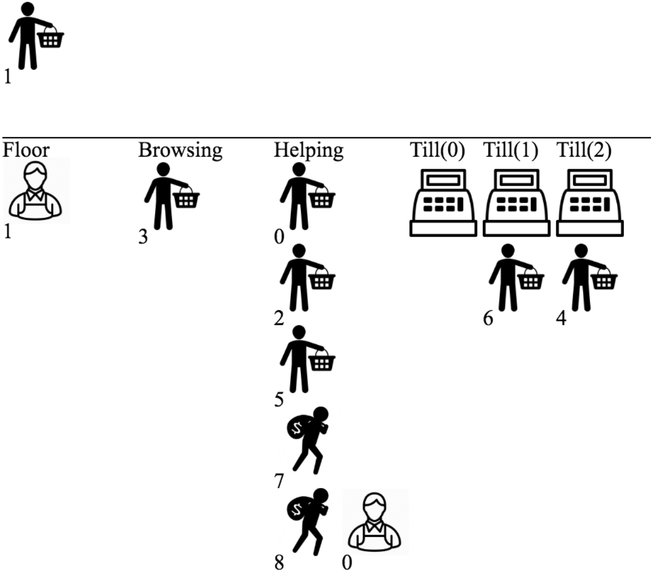
```
Time(n)[prob(buy)]/
tills <- Queue(self,t,tSale,tLim)
where t = rnd(#tills)
```

```
Time(n)[prob(help)]/
counter := 0
```

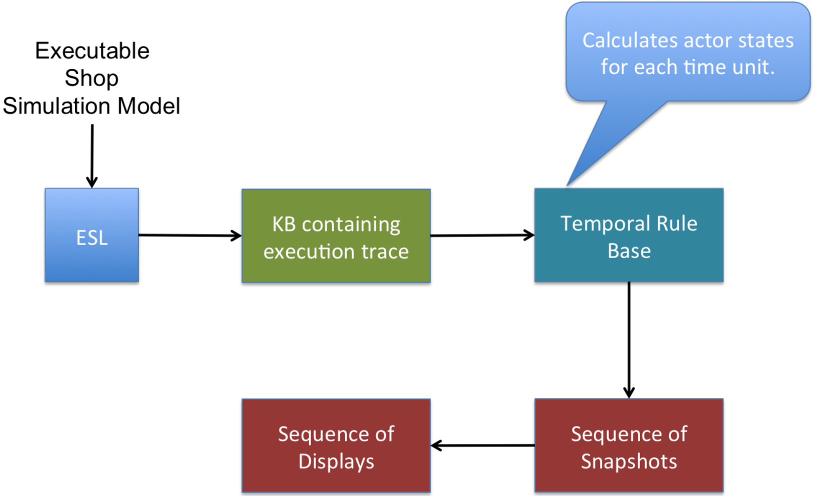
```
Helped/
tills <- Queue(self,t,tSale,tLim)
where t = rnd(#tills)
```

```
Time(n)[counter < tLim]/
counter++
```

Filmstrip Snapshots



Filmstrip Production



History Pattern

$$\begin{tikzcd}
{([E], i : E \to \mathrm{Int})} \arrow[r, "\sigma"] \arrow[d, "\omega"'] & {([[E]], i : E \to \mathrm{Int})} \arrow[d, "\mu^*"] \\
{[D]} & {[S]} \arrow[l, "\gamma^*"]
\end{tikzcd}$$

E	Events
$i : E \to \mathrm{Int}$	Event Owner
$([E], i : E \to \mathrm{Int})$	Event Histories
$[[E]]$	Snapshots
$(S, \oplus, \epsilon)$	Semantics Monoid
$\phi : M \to S$	Semantic Mapping
$\mu = \mathrm{foldr}(\phi, \oplus, \epsilon)$	Snapshot Mapping
D	Displays
$[D]$	Filmstrips