Registros de commits da entrega final:

Este documento tem como objetivo mostrar os commits realizados para a entrega final do PP da disciplina de Modelagem e simulação (INE5425)

Nessa entrega, foi desenvolvimento do inicio, o componente While, que opera em conjunto com o componente Endwhile (também desenvolvido do 0)

```
+ #include "While.h"
+ #include "Model.h"
+ #include "Attribute.h"
+ #include "Resource.h"
+
+ While::While(Model* model): ModelComponent(model, Util::TypeOf<While>()) {
+
+ }
+
+ While::While(const While& orig) : ModelComponent(orig) {
+ }
+
+ While::~While() {
+ }
+
+ std::string While::show() {
+     return ModelComponent::show() +
+           "";
+ }
+
+ PluginInformation* While::GetPluginInformation() {
+     return new PluginInformation(Util::TypeOf<While>(), &While::LoadInstance);
+ }
+
+ ModelComponent* While::LoadInstance(Model* model, std::map<std::string, std::string>* fields) {
+     While* newComponent = new While(model);
+     try {
+       newComponent->_loadInstance(fields);
+     } catch (const std::exception& e) {
+     }
+     return newComponent;
+ }
```

```
  void While::_execute(Entity* entity) {
+     auto value = _model->parseExpression(_condition);
+     if (value) {
+         _model->sendEntityToComponent(entity, this->getNextComponents()->front(), 0.0);
+     } else {
+         _model->sendEntityToComponent(entity, _attached_endwhile->getNextComponents()->front(), 0.0);
```

```
+ class Endwhile : public ModelComponent {
+
+ public:
+     Endwhile(Model* model);
+     Endwhile(const Endwhile& orig);
+     virtual ~Endwhile();
+
+     virtual std::string show();
+     static PluginInformation* GetPluginInformation();
+     static ModelComponent* LoadInstance(Model* model, std::map<std::string, std::string>* fields);
+
+     void set_label(std::string value) {
+         _label = value;
+     }
+
+     std::string get_label(std::string value) {
+         return _label;
+     }
+
+     While* get_while() {
+         return _attached_while;
+     }
+
+     void attach_while(While* the_while) {
+         _attached_while = the_while;
+     }
+
+ protected:
+     virtual void _execute(Entity* entity);
+     virtual bool _loadInstance(std::map<std::string, std::string>* fields);
+     virtual void _initBetweenReplications();
+     virtual std::map<std::string, std::string>* _saveInstance();
+     virtual bool _check(std::string* errorMessage);
+
+ private:
+     std::string _label = "";
```

```
@@ -17,6 +17,7 @@
 #include "ModelComponent.h"
 #include "Plugin.h"
 #include "Queue.h"
+#include "Endwhile.h"

 class While : public ModelComponent {

@@ -32,21 +33,19 @@ class While : public ModelComponent {
     void set_label(std::string value) {
         _label = value;
     }
-    void set_endwhile_label(std::string value) {
-        _endwhile_label = value;
-    }
+    void attach_endwhile(Endwhile* endwhile) { _attached_endwhile = endwhile; }

     void set_condition(std::string expr) {
         _condition = expr;
     }

-    std::string get_label(std::string value) {
+    std::string get_label() {
         return _label;
     }
-    std::string get_endwhile_label(std::string value) {
-        return _endwhile_label;
-    }

+    Endwhile* get_endwhile() {
+        return _attached_endwhile;
+    }
```

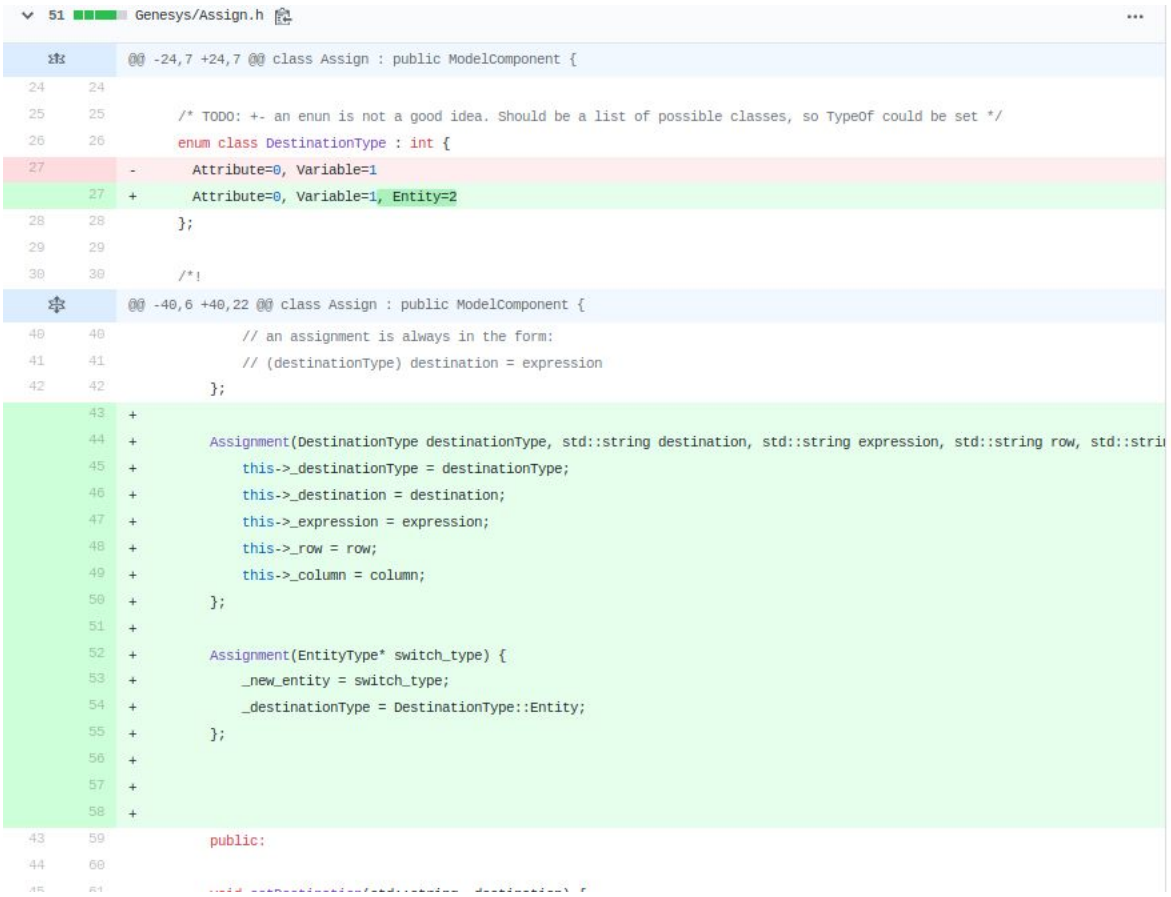
Implementação do signal voltou a ser como era antes, iterando pelos holds

31 Genesys/Signal.cpp

```
@@ -20,15 +20,16 @@ inline bool instanceof(const T*) {
20 20       return std::is_base_of<Base, T>::value;
21 21   }
22 22
23    - //TODO Colocar o instance of antes daquele cast ali.
24    -
25 23   void Signal::_execute(Entity* entity) {
26    -     for(int i = 0; i < _holds_waiting_signal->size(); i++) {
27    -         Waiting* waiting = _holds_waiting_signal->getAtRank(i);
28    -
29    -         auto component = waiting->getComponent();
30    -         Hold* h = ((Hold*)(component));
31    -         h->release_signal(limit);
   24 +     std::list<ModelComponent*>::iterator it = _model->getComponentManager()->begin();
   25 +     for (; it != _model->getComponentManager()->end(); it++) {
   26 +         auto component = *it;
   27 +         if (instanceof<Hold>(*it)) {
   28 +             Hold* h = ((Hold*)(*it));
   29 +             if (h->getWaitForValueExpr() == signalName) {
   30 +                 h->release_signal(limit);
   31 +             }
   32 +         }
32 33       }
33 34   }
34 35   std::string Signal::show() {
@@ -42,20 +43,6 @@ void Signal::_initBetweenReplications() {
42 43
43 44   }
44 45
45    -
46    - void Signal::setQueueName(std::string _name) throw() {
47    -     Queue* queue = dynamic_cast<Queue*>(_model->getElementManager()->getElement(Util::TypeOf<Queue>(), _name));
48    -     if (queue != nullptr) {
49    -         _holds_waiting_signal = queue;
50    -     } else {
51    -         throw std::invalid_argument("Queue does not exist");
```

Foi modificado o assign também, para funcionar com variáveis de duas dimensões, e para fazer a troca de um EntityType.

```
56  56  void Assign::_execute(Entity* entity) {
57      -   if (_switch_entity) {
58      -       entity->setEntityType(_new_entity);
59      -   } else {
60      -       Assignment* let;
61      -       std::list<Assignment*>* lets = this->_assignments->getList();
62      -       for (std::list<Assignment*>::iterator it = lets->begin(); it != lets->end(); it++) {
63      -           let = (*it);
64      -           double value = _model->parseExpression(let->getExpression());
65      -           _model->getTraceManager()->trace(Util::TraceLevel::blockInternal, "Let \"" + let->getDestination() + "\" = " + std:
66      -           /* TODO: this is NOT the best way to do it (enum comparision) */
67      -           if (let->getDestinationType() == DestinationType::Variable) {
68      -               Variable* myvar = (Variable*) this->_model->getElementManager()->getElement(Util::TypeOf<Variable>(), let->getD
        57  +
        58  +   Assignment* let;
        59  +   std::list<Assignment*>* lets = this->_assignments->getList();
        60  +   for (std::list<Assignment*>::iterator it = lets->begin(); it != lets->end(); it++) {
        61  +       let = (*it);
        62  +       double value = _model->parseExpression(let->getExpression());
        63  +       _model->getTraceManager()->trace(Util::TraceLevel::blockInternal, "Let \"" + let->getDestination() + "\" = " + std::to_
        64  +       /* TODO: this is NOT the best way to do it (enum comparision) */
        65  +       if (let->getDestinationType() == DestinationType::Variable) {
        66  +           Variable* myvar = (Variable*) this->_model->getElementManager()->getElement(Util::TypeOf<Variable>(), let->getDesti
        67  +           if (let->getRow() != "" && let->getColumn() != "") {
        68  +               std::string index = std::to_string(_model->parseExpression(let->getRow())) + std::to_string(_model->parseExpres
        69  +               myvar->setValue(index, value);
        70  +           } else {
69  71                  myvar->setValue(value);
70      -           } else if (let->getDestinationType() == DestinationType::Attribute) {
71      -               entity->setAttributeValue(let->getDestination(), value);
72  72              }
        73  +       } else if (let->getDestinationType() == DestinationType::Attribute) {
        74  +           entity->setAttributeValue(let->getDestination(), value);
        75  +       } else if (let->getDestinationType() == DestinationType::Entity) {
        76  +           entity->setEntityType(let->new_entity());
```



```
51 Genesys/Assign.h
@@ -24,7 +24,7 @@ class Assign : public ModelComponent {
24 24
25 25       /* TODO: +- an enun is not a good idea. Should be a list of possible classes, so TypeOf could be set */
26 26       enum class DestinationType : int {
27    -       Attribute=0, Variable=1
   27 +       Attribute=0, Variable=1, Entity=2
28 28       };
29 29
30 30       /*!
@@ -40,6 +40,22 @@ class Assign : public ModelComponent {
40 40               // an assignment is always in the form:
41 41               // (destinationType) destination = expression
42 42           };
   43 +
   44 +         Assignment(DestinationType destinationType, std::string destination, std::string expression, std::string row, std::stri
   45 +             this->_destinationType = destinationType;
   46 +             this->_destination = destination;
   47 +             this->_expression = expression;
   48 +             this->_row = row;
   49 +             this->_column = column;
   50 +         };
   51 +
   52 +         Assignment(EntityType* switch_type) {
   53 +             _new_entity = switch_type;
   54 +             _destinationType = DestinationType::Entity;
   55 +         };
   56 +
   57 +
   58 +
43 59           public:
44 60
```

No pluginConnector e no BaseGenesysConsoleApplication foi adicionado os novos componentes que lá não estavam

```
115 117       GetInfo = &Hold::GetPluginInformation;
116 118       else if (fn=="signal.so")
117 119       GetInfo = &Signal::GetPluginInformation;
    120 +     else if (fn=="separate.so")
    121 +     GetInfo = &Separate::GetPluginInformation;
    122 +     else if (fn=="search.so")
    123 +     GetInfo = &Search::GetPluginInformation;
118 124       else if (fn=="while.so")
119 125       GetInfo = &While::GetPluginInformation;
120 126       else if (fn=="endwhile.so")
```

```
+     simulator->getPluginManager()->insert("while.so");
+     simulator->getPluginManager()->insert("endwhile.so");
```

Todas essas alterações vieram por meio de vários commits, alterações intermediarias foram omitidas, pois não acrescentariam em nada.

Apenas para citar algumas

Foram feitas alterações no Search, porém revertidas pois não estavam apresentando comportamento esperado.

O mesmo vale para algumas alterações feitas no Assign, antes de chegar ao que está descrito acima.

Testes:

Foram criados modelos para testar componentes criados: While, endwhile, Hold e Signal
E componentes alterados: Assign

Alguns outros componentes acabaram sendo testados em conjunto pois faziam parte dos modelos.

Os testes realizados estão no arquivo testes.zip

Resultados TesteSignalEHold1:

Genesys -

```
Begin of Report for Simulation (based on 3 replications)
| Statistis for Create:
| | Create_1:
| | | name                                  elems      min          max          average      variance     stddev       varCoef      confInterv   confLevel
| | | Count number in..................... 3          9600.000000  9600.000000  9600.000000  0.000000     0.000000     0.000000     0.000000     0.950000
| | Create_2:
| | | name                                  elems      min          max          average      variance     stddev       varCoef      confInterv   confLevel
| | | Count number in..................... 3          2401.000000  2401.000000  2401.000000  0.000000     0.000000     0.000000     0.000000     0.950000
| Statistis for Dispose:
| | Dispose_1:
| | | name                                  elems      min          max          average      variance     stddev       varCoef      confInterv   confLevel
| | | Dispose_1.Count_number_out.......... 3          0.000000     0.000000     0.000000     0.000000     0.000000     0.000000     0.000000     0.950000
| | Dispose_2:
| | | name                                  elems      min          max          average      variance     stddev       varCoef      confInterv   confLevel
| | | Dispose_2.Count_number_out.......... 3          0.000000     0.000000     0.000000     0.000000     0.000000     0.000000     0.000000     0.950000
| Statistis for EntityType:
| | Entity:
| | | name                                  elems      min          max          average      variance     stddev       varCoef      confInterv   confLevel
| | | Entity.Total_Time................... 3          0.000000     0.000000     0.000000     0.000000     0.000000     0.000000     0.000000     0.950000
| | | Delay_1.Waiting_Time................ 3          0.006944     0.006944     0.006944     0.000000     0.000000     0.000000     0.000000     0.950000
| Statistis for Queue:
| | Queue_HOLD_1:
| | | name                                  elems      min          max          average      variance     stddev       varCoef      confInterv   confLevel
| | | Queue_HOLD_1.Number_In_Queue........ 3          4800.500000  4800.500000  4800.500000  0.000000     0.000000     0.000000     0.000000     0.950000
| | | Queue_HOLD_1.Time_In_Queue.......... 3          0.000000     0.000000     0.000000     0.000000     0.000000     0.000000     0.000000     0.950000
End of Report for Simulation
imulation of model "Model 1" has finished.
```

Arena -

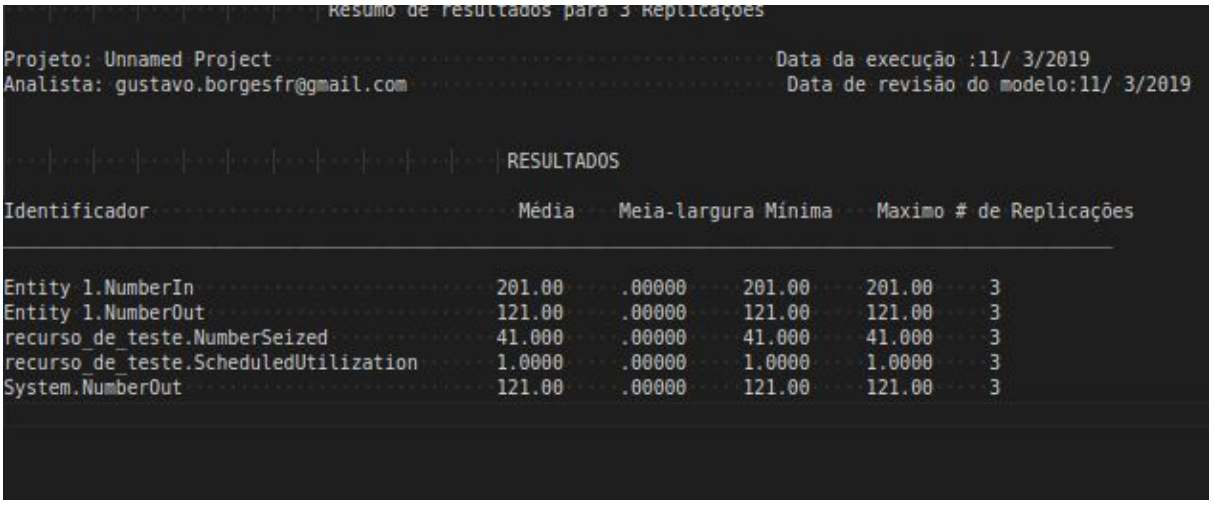
```
                         ARENA Simulation Results
                        gustavo.borgesfr@gmail.com

                  Resumo de resultados para 3 Replicações

Projeto: Unnamed Project                                  Data da execução :11/ 6/2019
Analista: gustavo.borgesfr@gmail.com                      Data de revisão do modelo:11/ 6/2019


                              RESULTADOS

Identificador                          Média    Meia-largura Mínima    Maximo # de Replicações
_____________________________________________________________________________________________

Entity 1.NumberIn                     30001.     .00000     30001.     30001.     3
Entity 1.NumberOut                    30000.     .00000     30000.     30000.     3
System.NumberOut                      30000.     .00000     30000.     30000.     3

Tempo executando a simulação: 0.00 minutos.
Simulação completada.
```

Resultados TesteSignalEHold2:

Genesys -

```
Begin of Report for Simulation (based on 3 replications)
| Statistis for Create:
| | Create_1:
| | | name                                  elems      min         max         average     variance    stddev      varCoef     confInterv  confLevel
| | | Count number in..................... 3          48.000000   48.000000   48.000000   0.000000    0.000000    0.000000    0.000000    0.950000
| | Create_2:
| | | name                                  elems      min         max         average     variance    stddev      varCoef     confInterv  confLevel
| | | Count number in..................... 3          33.000000   33.000000   33.000000   0.000000    0.000000    0.000000    0.000000    0.950000
| Statistis for Dispose:
| | Dispose_1:
| | | name                                  elems      min         max         average     variance    stddev      varCoef     confInterv  confLevel
| | | Dispose_1.Count_number_out.......... 3          0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.950000
| | Dispose_2:
| | | name                                  elems      min         max         average     variance    stddev      varCoef     confInterv  confLevel
| | | Dispose_2.Count_number_out.......... 3          0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.950000
| Statistis for EntityType:
| | Entity:
| | | name                                  elems      min         max         average     variance    stddev      varCoef     confInterv  confLevel
| | | Entity.Total_Time................... 3          0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.950000
| | | Delay_1.Waiting_Time................ 3          0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.950000
| Statistis for Queue:
| | Queue_HOLD_1:
| | | name                                  elems      min         max         average     variance    stddev      varCoef     confInterv  confLevel
| | | Queue_HOLD_1.Number_In_Queue........ 3          1.000000    1.000000    1.000000    0.000000    0.000000    0.000000    0.000000    0.950000
| | | Queue_HOLD_1.Time_In_Queue.......... 3          0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.950000
| | Queue_SEIZE_1:
| | | name                                  elems      min         max         average     variance    stddev      varCoef     confInterv  confLevel
| | | Queue_SEIZE_1.Number_In_Queue....... 3          24.000000   24.000000   24.000000   0.000000    0.000000    0.000000    0.000000    0.950000
| | | Queue_SEIZE_1.Time_In_Queue......... 3          0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.950000
| Statistis for Resource:
| | test_res:
| | | name                                  elems      min         max         average     variance    stddev      varCoef     confInterv  confLevel
| | | test_res.Time_Seized................ 3          0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.950000
| | | test_res.Seizes..................... 3          1.000000    1.000000    1.000000    0.000000    0.000000    0.000000    0.000000    0.950000
| | | test_res.Releases................... 3          0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.000000    0.950000
| End of Report for Simulation
Simulation of model "Model 1" has finished.
```

Arena



Resumo de resultados para 3 replicações

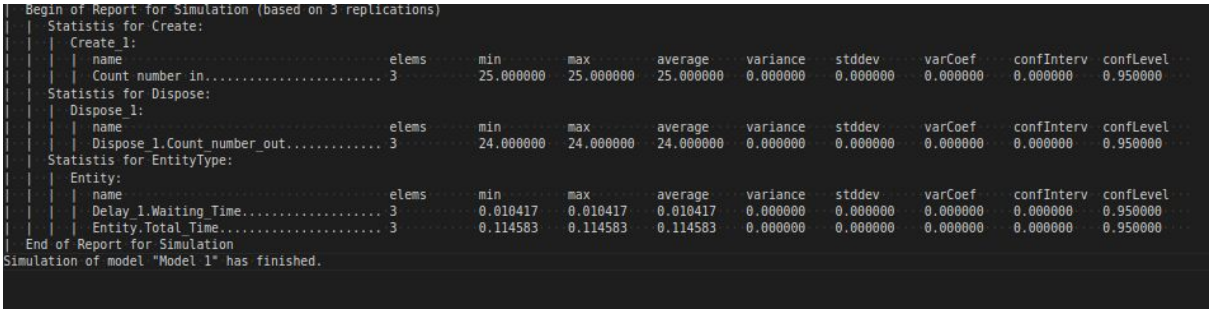
Projeto: Unnamed Project — Data da execução :11/ 3/2019
Analista: gustavo.borgesfr@gmail.com — Data de revisão do modelo:11/ 3/2019

RESULTADOS

Identificador	Média	Meia-largura Mínima		Maximo # de Replicações
Entity 1.NumberIn	201.00	.00000	201.00	201.00	3
Entity 1.NumberOut	121.00	.00000	121.00	121.00	3
recurso_de_teste.NumberSeized	41.000	.00000	41.000	41.000	3
recurso_de_teste.ScheduledUtilization	1.0000	.00000	1.0000	1.0000	3
System.NumberOut	121.00	.00000	121.00	121.00	3

Teste While e Endwhile

Genesys:



Begin of Report for Simulation (based on 3 replications)
Statistis for Create:
Create_1:

name	elems	min	max	average	variance	stddev	varCoef	confInterv	confLevel
Count number in.....	3	25.000000	25.000000	25.000000	0.000000	0.000000	0.000000	0.000000	0.950000

Statistis for Dispose:
Dispose_1:

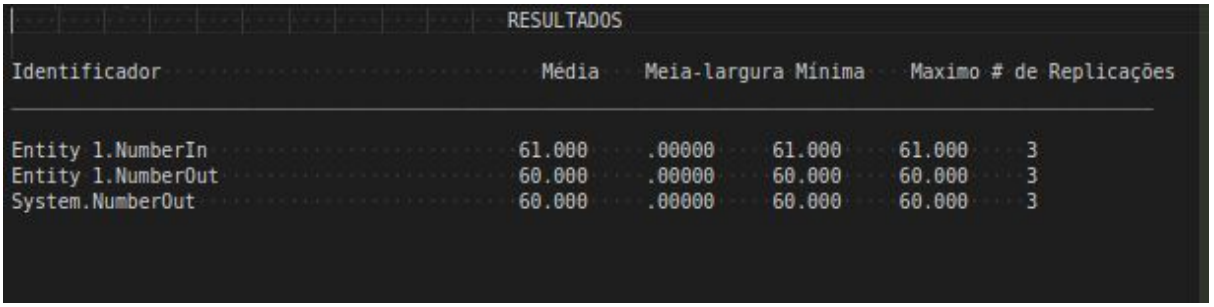
name	elems	min	max	average	variance	stddev	varCoef	confInterv	confLevel
Dispose_1.Count_number_out.....	3	24.000000	24.000000	24.000000	0.000000	0.000000	0.000000	0.000000	0.950000

Statistis for EntityType:
Entity:

name	elems	min	max	average	variance	stddev	varCoef	confInterv	confLevel
Delay_1.Waiting_Time.....	3	0.010417	0.010417	0.010417	0.000000	0.000000	0.000000	0.000000	0.950000
Entity.Total_Time.....	3	0.114583	0.114583	0.114583	0.000000	0.000000	0.000000	0.000000	0.950000

End of Report for Simulation
Simulation of model "Model 1" has finished.

Arena:



RESULTADOS

Identificador	Média	Meia-largura Mínima		Maximo # de Replicações
Entity 1.NumberIn	61.000	.00000	61.000	61.000	3
Entity 1.NumberOut	60.000	.00000	60.000	60.000	3
System.NumberOut	60.000	.00000	60.000	60.000	3

O que falta:

As implementações do Hold e do Signal parecem OK. a do while no entanto, dados os resultados de alguns testes, parece um pouco problemático.

Faltou implementar corretamente o Search.