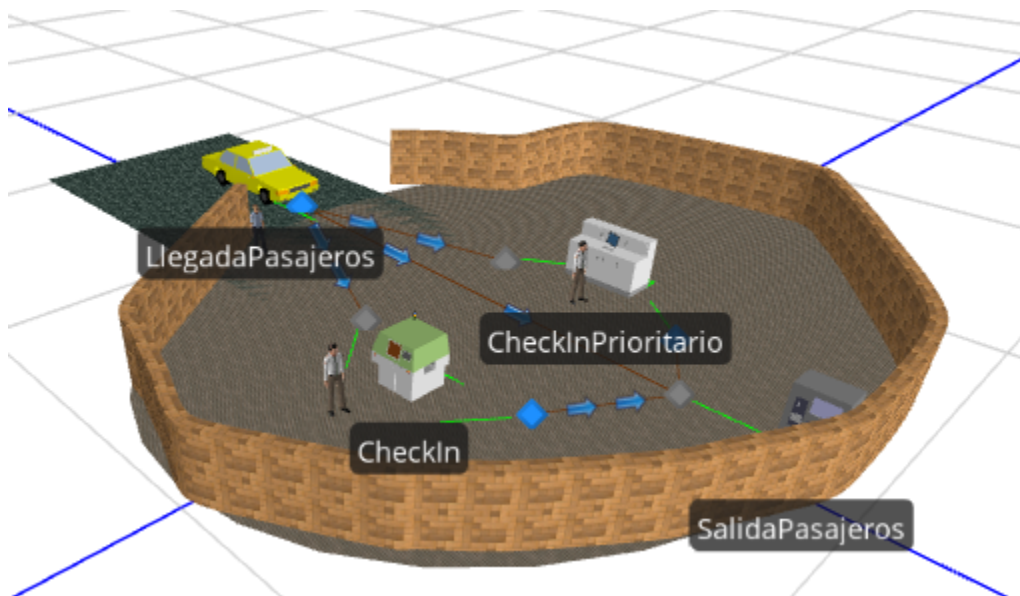


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# MEMORIA ENTREGA VOLUNTARIA DE SIMIO 3

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## DISEÑO DE MODELOS DE SIMULACIÓN

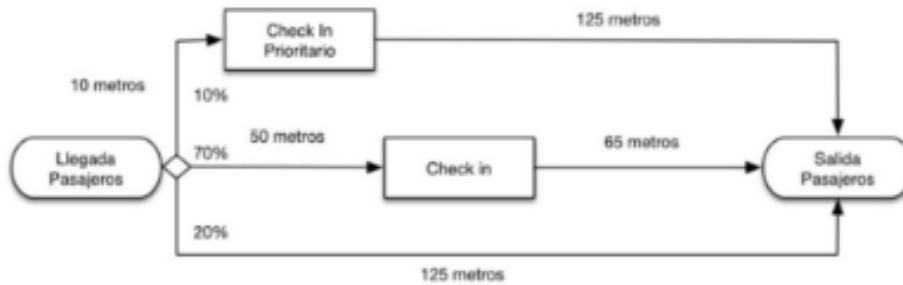


Juan Bautista Muñoz Ruiz

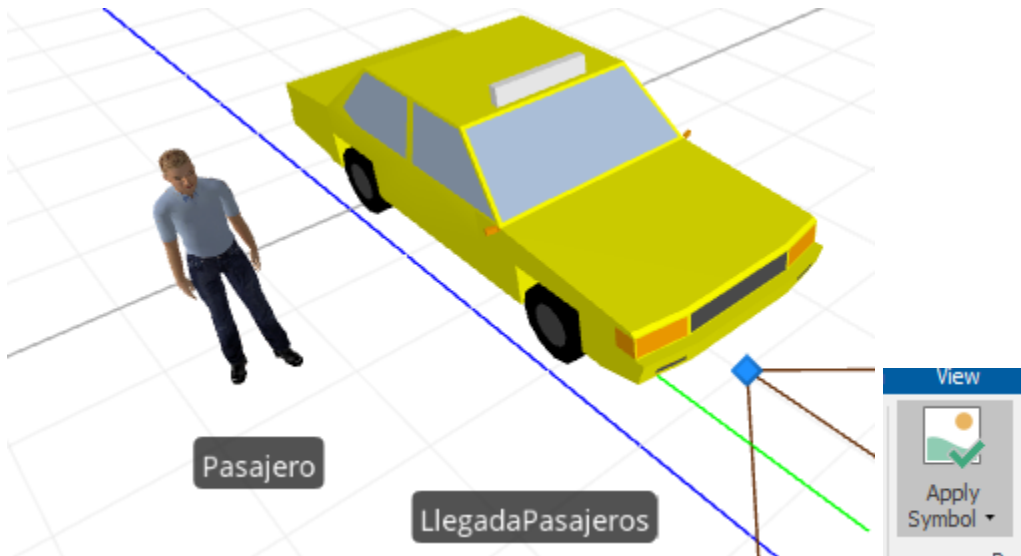
*[jbmr0001@red.ujaen.es](mailto:jbmr0001@red.ujaen.es)*

## Aeropuerto 2:

Siguiendo el siguiente modelo disponemos los objetos:



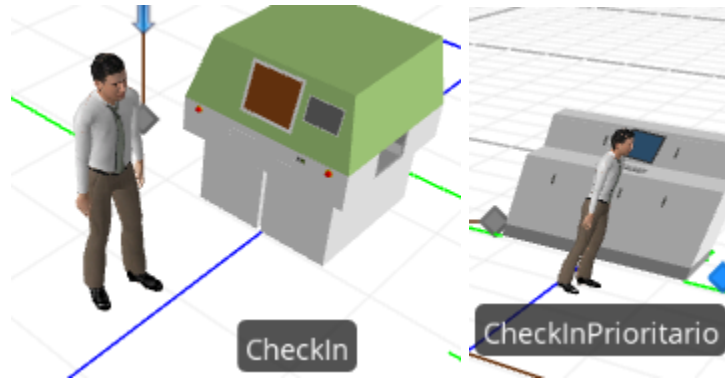
- Creamos un Source llamado LlegadaPasajeros y su correspondiente ModelEntity Pasajero, se le ha asignado a Llegada Pasajeros un símbolo en forma de Taxi:



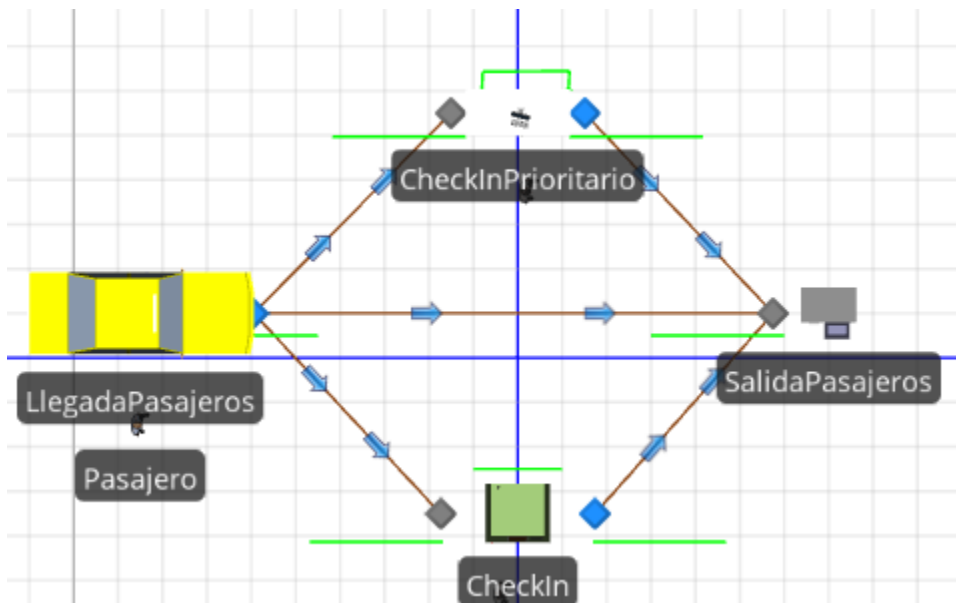
- Creamos el Sink llamado SalidaPasajeros y le asociamos un símbolo en forma de máquina:



- Creamos los dos servidores de nuestra simulación, el CheckInPrioritario y el CheckIn y le colocamos un trabajador a cada uno:



Establecemos las conexiones entre todos los elementos mediante "Path":



- Asignamos las distancias de cada conexión según las indicaciones del modelo activando la opción "Drawn to Scale" e indicando la distancia en su unidad correspondiente:
  - LlegadaPasajeros a CheckInPrioritario:

|                |        |
|----------------|--------|
| Drawn To Scale | False  |
| Logical Length | 10.0   |
| Units          | Meters |

- LlegadaPasajeros a SalidaPasajeros:

|                    |                    |
|--------------------|--------------------|
| Entry Ranking Rule | First In First Out |
| Drawn To Scale     | False              |
| Logical Length     | 125.0              |
| Allow Bypass       | True               |

- LlegadaPasajeros a CheckIn:

|                         |                    |
|-------------------------|--------------------|
| Initial Traveler Cap... | Infinity           |
| Entry Ranking Rule      | First In First Out |
| Drawn To Scale          | False              |
| Logical Length          | 50.0               |
| Allow Bypass            | True               |

- CheckIn a Salida Pasajeros:

|                    |                    |
|--------------------|--------------------|
| Entry Ranking Rule | First In First Out |
| Drawn To Scale     | <b>False</b>       |
| Logical Length     | <b>65.0</b>        |
| Units              | Meters             |

- CheclnPrioritario a SalidaPasajeros:

|                    |                    |
|--------------------|--------------------|
| Entry Ranking Rule | First In First Out |
| Drawn To Scale     | <b>False</b>       |
| Logical Length     | <b>125.0</b>       |

- Asignamos las probabilidades de cada camino, en primer lugar configuramos el nodo de decisión:

|                          |                       |
|--------------------------|-----------------------|
| Outbound Travel Mode     | Continue              |
| Outbound Link Preference | Any                   |
| Outbound Link Rule       | <b>By Link Weight</b> |
| Entity Destination Type  | Continue              |

- LlegadaPasajeros a CheckInPrioritario:

|                      |             |
|----------------------|-------------|
| Speed Limit          | Infinity    |
| <b>Routing Logic</b> |             |
| Selection Weight     | <b>10.0</b> |

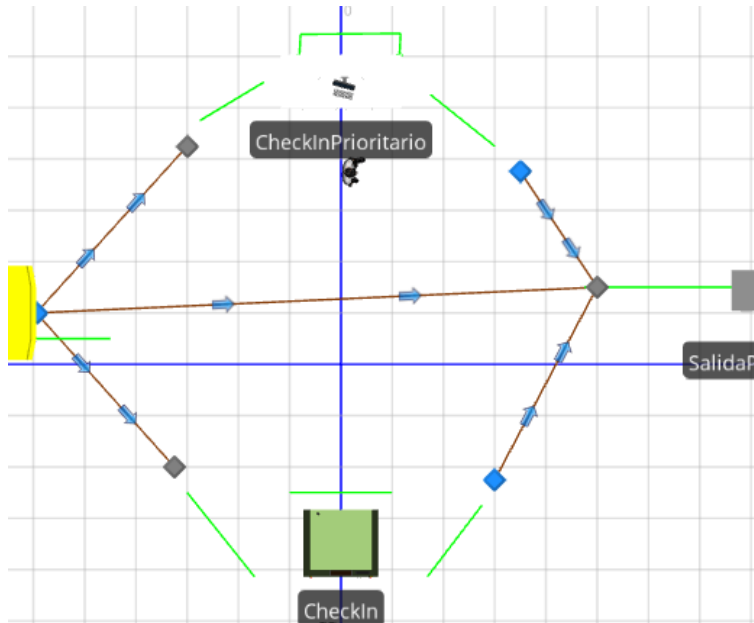
- LlegadaPasajeros a CheckIn:

|                      |             |
|----------------------|-------------|
| Speed Limit          | Infinity    |
| <b>Routing Logic</b> |             |
| Selection Weight     | <b>70.0</b> |

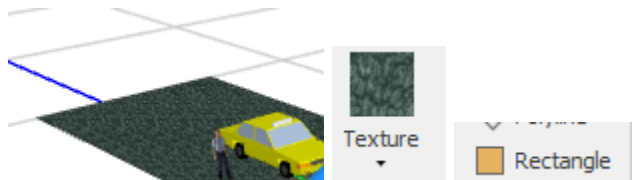
- LlegadaPasajeros a SalidaPasajeros:

|                          |             |
|--------------------------|-------------|
| Speed Limit              | Infinity    |
| <b>Routing Logic</b>     |             |
| Selection Weight         | <b>20.0</b> |
| <b>State Assignments</b> |             |

Se han dispuesto las colas de una manera realista:



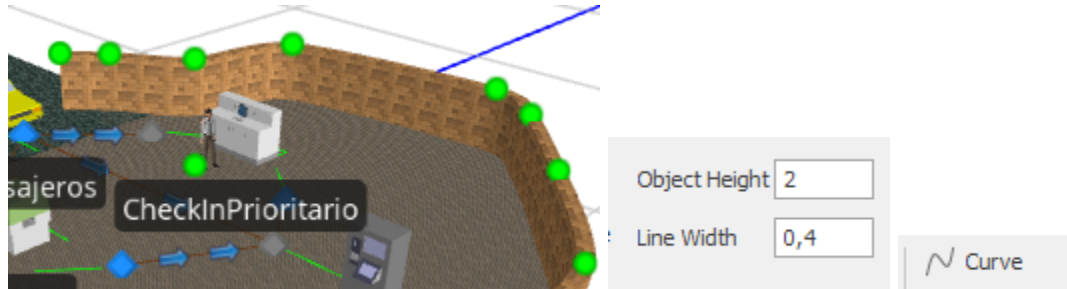
Se ha creado un rectángulo para el suelo de la entrada y se le ha aplicado una textura:



Se ha creado una elipse para el suelo del aeropuerto y se le ha asignado una textura:



Se ha creado una línea curva, se ha modificado su altura y anchura y se le ha aplicado una textura:



Se han creado varios símbolos para los Pasajeros y se ha habilitado la opción "Random Symbol" del ModelEntity:



Ejecutamos y observamos los resultados.

| Object type | Object name | Data source  | Category   | Data item       | Status          | Average total |
|-------------|-------------|--------------|------------|-----------------|-----------------|---------------|
| ModelEntity | Pasajero    | [Population] | Content    | NumberInSystem  | Average         | 105,8303      |
|             |             |              |            |                 | Maximum         | 208,0000      |
|             |             |              | FlowTime   | TimeInSystem    | Average (Hou... | 1,8274        |
|             |             |              |            |                 | Maximum (Ho...  | 3,8477        |
|             |             |              |            |                 | Minimum (Hou... | 0,0088        |
|             |             |              |            |                 | Observations    | 1.174,0000    |
|             |             |              | Throughput | NumberCreated   | Total           | 1.381,0000    |
|             |             |              |            | NumberDestroyed | Total           | 1.174,0000    |
| Path        | Path1       | [Travelers]  | Content    | NumberOnLink    | Average         | 0,2535        |
|             |             |              |            |                 | Maximum         | 4,0000        |
|             |             |              | FlowTime   | TimeOnLink      | Average (Hou... | 0,0044        |
|             |             |              |            |                 | Maximum (Ho...  | 0,0063        |

Creamos una Rate table:

|   | Starting Onset  | Ending Onset    | Rate (events per hour) |
|---|-----------------|-----------------|------------------------|
| ▶ | Day 1, 00:00:00 | Day 1, 01:00:00 | 20                     |
|   | Day 1, 01:00:00 | Day 1, 02:00:00 | 0                      |
|   | Day 1, 02:00:00 | Day 1, 03:00:00 | 10                     |
|   | Day 1, 03:00:00 | Day 1, 04:00:00 | 0                      |
|   | Day 1, 04:00:00 | Day 1, 05:00:00 | 0                      |
|   | Day 1, 05:00:00 | Day 1, 06:00:00 | 0                      |
|   | Day 1, 06:00:00 | Day 1, 07:00:00 | 0                      |
|   | Day 1, 07:00:00 | Day 1, 08:00:00 | 0                      |
|   | Day 1, 08:00:00 | Day 1, 09:00:00 | 0                      |
|   | Day 1, 09:00:00 | Day 1, 10:00:00 | 20                     |

|              |      |
|--------------|------|
| 21.9<br>4.32 | Data |
|--------------|------|

Modificamos las propiedades de la EntradaPasajeros para incluir la Rate Table:

| Properties: LlegadaPasajeros (Source) |                           |
|---------------------------------------|---------------------------|
| Entity Arrival Logic                  |                           |
| Entity Type                           | Pasajero                  |
| Arrival Mode                          | Time Varying Arrival Rate |
| Rate Table                            | RateTable1                |
| Rate Scale Factor                     | 1.0                       |

Ejecutamos y observamos los resultados. Baja considerablemente el flujo debido a la nueva tabla:



| Object Type ▲ | Object Name ▲ | Data Source ▲ | Category ▲ | Data Item ▲     | Statistic ▲     | Average Total |
|---------------|---------------|---------------|------------|-----------------|-----------------|---------------|
| ModelEntity   | Pasajero      | [Population]  | Content    | NumberInSystem  | Average         | 0,1335        |
|               |               |               |            |                 | Maximum         | 4,0000        |
|               |               |               | FlowTime   | TimeInSystem    | Average (Hou... | 0,0286        |
|               |               |               |            |                 | Maximum (Ho...  | 0,0673        |
|               |               |               |            |                 | Minimum (Hou... | 0,0247        |
|               |               |               |            |                 | Observations    | 112,0000      |
|               |               |               | Throughput | NumberCreated   | Total           | 112,0000      |
|               |               |               |            | NumberDestroyed | Total           | 112,0000      |
| Path          | Path1         | [Travelers]   | Content    | NumberOnLink    | Average         | 0,0011        |
|               |               |               |            |                 | Maximum         | 1,0000        |
|               |               |               | FlowTime   | TimeOnLink      | Average (Hou... | 0,0020        |

Creamos una Data Table para establecer los tiempos de atención de cada servidor:

|     | PrioridadPasajero | TiempoCheckInPrioritario | TiempoCheckIn       |
|-----|-------------------|--------------------------|---------------------|
| ► 1 | 1                 | Random.Triangular(1,2,5) | Random.Uniform(2,5) |
| 2   | 2                 | Random.Triangular(2,3,6) | Random.Uniform(3,5) |
| 3   | 3                 | Random.Triangular(3,4,7) | Random.Uniform(4,6) |

Establecemos las unidades de tiempo para las propiedades de la tabla en minutos:

|                      |           |
|----------------------|-----------|
| ▲ Value              |           |
| Default Value        | 0.0       |
| Candidate References | False     |
| Unit Type            | Time      |
| Default Units        | Minutes ▼ |
| ▲ Appearance         |           |

Establecemos las prioridades del Pasajero con una distribución discreta con 0,33 para cada prioridad:

|                              |                                      |
|------------------------------|--------------------------------------|
| ▲ Travel Logic               |                                      |
| Initial Desired Speed        | Random.Uniform(2,4)                  |
| Units                        | Miles per Hour                       |
| Initial Travel Mode          | Network If Possible                  |
| Initial Network              | Global                               |
| Network Turnaround Method    | Exit & Re-enter                      |
| Free Space Steering Behavior | Direct To Destination                |
| ▲ Routing Logic              |                                      |
| Initial Priority             | Random.Discrete(1,0.33,2,0.66,3,1.0) |
| Initial Sequence             |                                      |

Modificamos los tiempos de servicio de los dos servidores:

| Process Logic          |  |
|------------------------|--|
| Capacity Type          | Fixed  |
| Initial Capacity       | 1  |
| Ranking Rule           | First In First Out                                 |
| Dynamic Selection Rule | None   |
| Transfer-In Time       | 0.0  |
| Process Type           | Specific Time                                      |
| Processing Time        | Table2[Pasajero.Priority].TiempoCheckInPrioritario |

| Process Logic          |   |
|------------------------|---|
| Capacity Type          | Fixed                                   |
| Initial Capacity       | 1                                       |
| Ranking Rule           | First In First Out                      |
| Dynamic Selection Rule | None                                    |
| Transfer-In Time       | 0.0                                     |
| Process Type           | Specific Time                           |
| Processing Time        | Table2[Pasajero.Priority].TiempoCheckIn |

Observamos el siguiente error tal y como vimos en clase:

| Error Text   |
|--|
| Unable to resolve state 'Priority' as member of entity ... |