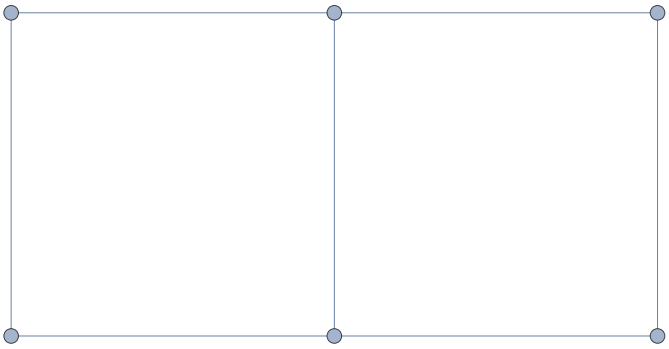
In[ ]:=

```
(*Define the size of the grid*)
gridSize = 10;

(*Generate places and transitions using strings with commas in indices*)
places = Table["p" <> ToString[i] <> "," <> ToString[j], {i, 1, gridSize}, {j, 1, gridSize}];
transitions = Table["t" <> ToString[i] <> "," <> ToString[j], {i, 1, gridSize}, {j, 1, gridSize

(*Flatten places and transitions for use in arcs and visualization*)
flatPlaces = Flatten[places];
flatTransitions = Flatten[transitions];

(*Define the arcs*)
arcs = Flatten[Table[{
      (*Horizontal connections*)
      places[[i, j]] → transitions[[i, j]], transitions[[i, j]] → places[[i, j]], If[j < gridSize, plac
      (*Vertical connections*)
      If[i < gridSize, places[[i, j]] → places[[i + 1, j]], Nothing], If[i < gridSize, places[[i + 1,

(*Define vertex coordinates for a grid layout*)
vertexCoordinates = Association[Join[
    (*Place positions*)
    Table[places[[i, j]] → {j, gridSize - i + 1}, {i, 1, gridSize}, {j, 1, gridSize}],
    (*Transition positions slightly offset from places*)
    Table[transitions[[i, j]] → {j + 0.3, gridSize - i + 0.7}, {i, 1, gridSize}, {j, 1, gridSize}]

(*Visualize the Petri net with Graph*)
Graph[arcs, VertexCoordinates → vertexCoordinates, GraphStyle → "Detailed", ImageSize → Large
```

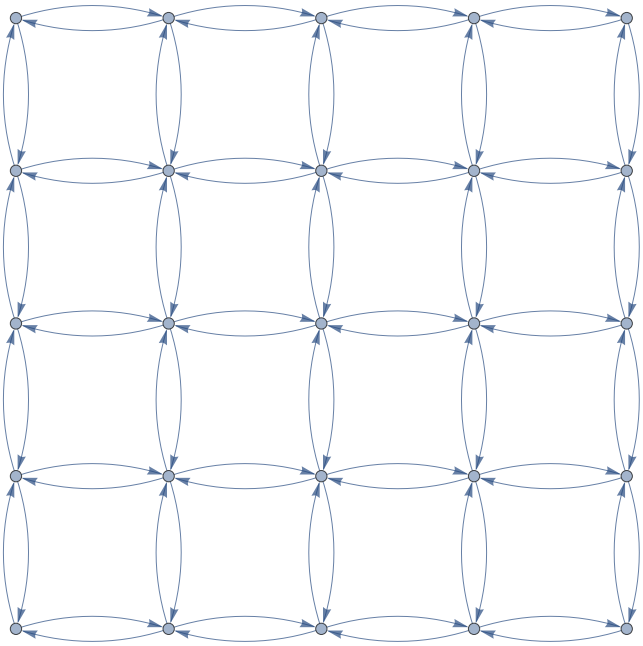
In[•]:=
```
GraphProduct[PathGraph[{1, 2}], PathGraph[{1, 2, 3}], GraphLayout → "GridEmbedding"]
```

Out[•]=



In[•]:=
```
(* Generate a CS2 hardware configuration *)
DirectedGraph[GridGraph[{5, 5}]]
```

Out[•]=



In[•]:=
```
(* Generate a systolic matrix multiplication communication configuration *)
vertices = Flatten[Table[{i, j}, {i, 5}, {j, 5}], 1];
edges = Join[Table[DirectedEdge[{i, j}, {i + 1, j}], {i, 4}, {j, 5}],
   Table[DirectedEdge[{i, j}, {i, j + 1}], {i, 5}, {j, 4}] ];
Graph[vertices, Flatten[edges], DirectedEdges → True,
 VertexCoordinates → Association[Table[{i, j} → {j, -i}, {i, 5}, {j, 5}] // Flatten]]
```

Out[•]=