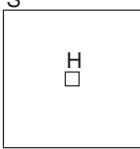
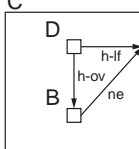
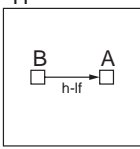
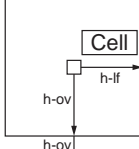
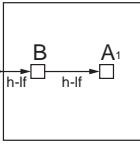
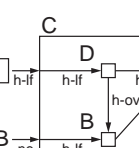
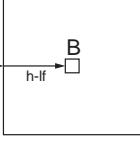
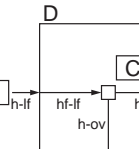
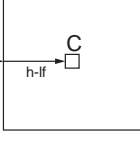
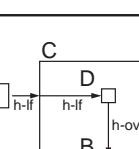
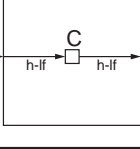
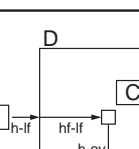
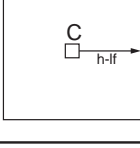


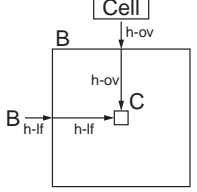
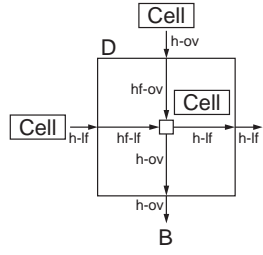
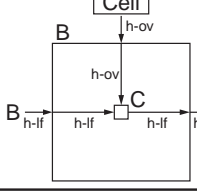
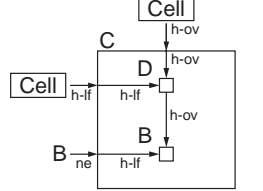
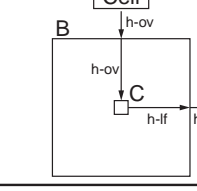
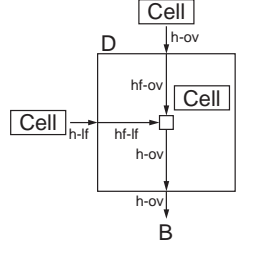
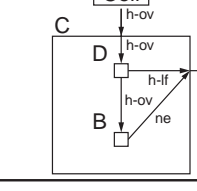
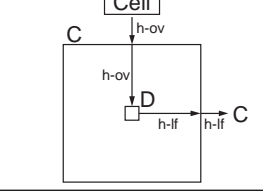
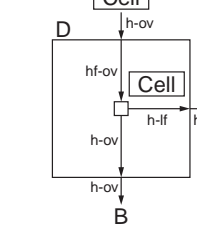
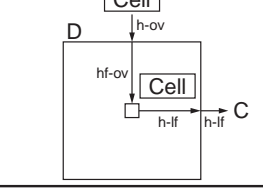
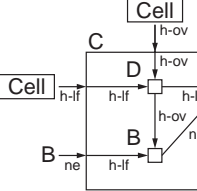
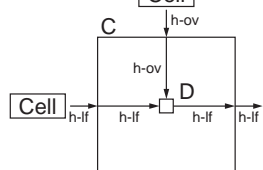
# **Appendix B**

## **An Attribute Graph Grammar for Tessellation Forms**

## Productions and Semantic Rules for Tessellation Forms (Horizontal Derivation 1)

<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p><b>S</b></p>  </div> <div> <p><math>x(H) = 0</math> <math>y(H) = 0</math></p> <p><math>width(S) = width(H)</math> <math>height(S) = height(H)</math></p> </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p><b>C</b></p>  </div> <div> <p><math>x(D) = x(C)</math> <math>y(D) = y(C)</math> <math>x(B) = x(C)</math> <math>y(B) = y(C) + height(D)</math></p> <p><math>width(C) = \max(width(D), width(B))</math> <math>height(C) = height(D) + height(B)</math></p> </div> </div>
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p><b>H</b></p>  </div> <div> <p><math>x(B) = x(A)</math> <math>y(B) = y(A)</math> <math>x(A) = x(H) + width(B)</math> <math>y(A) = y(H)</math></p> <p><math>width(H) = width(B) + width(A)</math> <math>height(H) = \max(height(B), height(A))</math></p> </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p><b>D</b></p>  </div> <div> <p><math>x(Cell) = x(D)</math> <math>y(Cell) = y(D)</math></p> <p><math>width(D) = WIDTH\_cell</math> <math>height(D) = HEIGHT\_cell</math></p> </div> </div>
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p><b>A<sub>0</sub></b></p>  </div> <div> <p><math>x(B) = x(A_0)</math> <math>y(B) = y(A_0)</math> <math>x(A_1) = x(A_0) + width(B)</math> <math>y(A_1) = y(A_0)</math></p> <p><math>width(A_0) = width(B) + width(A_1)</math> <math>height(A_0) = \max(height(B), height(A_1))</math></p> </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p><b>C</b></p>  </div> <div> <p><math>x(D) = x(C)</math> <math>y(D) = y(C)</math> <math>x(B) = x(C)</math> <math>y(B) = y(C) + height(D)</math></p> <p><math>width(C) = \max(width(D), width(B))</math> <math>height(C) = height(D) + height(B)</math></p> </div> </div>
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p><b>A</b></p>  </div> <div> <p><math>x(B) = x(A)</math> <math>y(B) = y(A)</math></p> <p><math>width(A) = width(B)</math> <math>height(A) = height(B)</math></p> </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p><b>D</b></p>  </div> <div> <p><math>x(Cell) = x(D)</math> <math>y(Cell) = y(D)</math></p> <p><math>width(D) = WIDTH\_cell</math> <math>height(D) = HEIGHT\_cell</math></p> </div> </div>
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p><b>B</b></p>  </div> <div> <p><math>x(C) = x(B)</math> <math>y(C) = y(B)</math></p> <p><math>width(B) = width(C)</math> <math>height(B) = height(C)</math></p> </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p><b>C</b></p>  </div> <div> <p><math>x(D) = x(C)</math> <math>y(D) = y(C)</math> <math>x(B) = x(C)</math> <math>y(B) = y(C) + height(D)</math></p> <p><math>width(C) = \max(width(D), width(B))</math> <math>height(C) = height(D) + height(B)</math></p> </div> </div>
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p><b>B</b></p>  </div> <div> <p><math>x(C) = x(B)</math> <math>y(C) = y(B)</math></p> <p><math>width(B) = width(C)</math> <math>height(B) = height(C)</math></p> </div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p><b>D</b></p>  </div> <div> <p><math>x(Cell) = x(D)</math> <math>y(Cell) = y(D)</math></p> <p><math>width(D) = WIDTH\_cell</math> <math>height(D) = HEIGHT\_cell</math></p> </div> </div>
<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p><b>B</b></p>  </div> <div> <p><math>x(C) = x(B)</math> <math>y(C) = y(B)</math></p> <p><math>width(B) = width(C)</math> <math>height(B) = height(C)</math></p> </div> </div>	

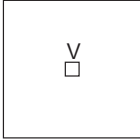
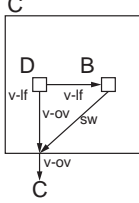
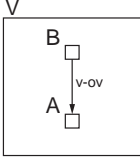
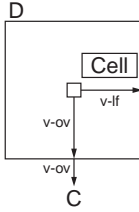
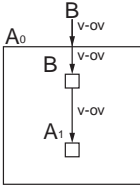
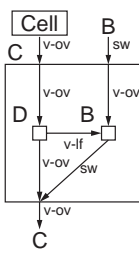
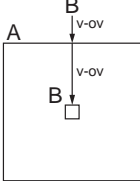
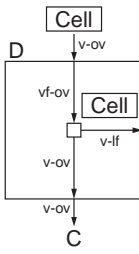
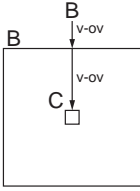
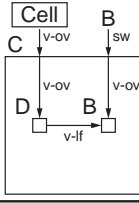
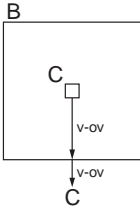
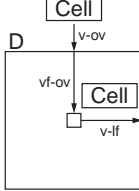
## Productions and Semantic Rules for Tessellation Forms (Horizontal Derivation 2)

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 <p style="margin-left: 20px;"> <math>x(C) = x(B)</math>  <math>y(C) = y(B)</math>  <math>width(B) = width(C)</math>  <math>height(B) = height(C)</math> </p>	 <p style="margin-left: 20px;"> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>x(B) = x(C)</math>  <math>y(B) = y(C) + height(D)</math>  <math>width(C) = \max(width(D), width(B))</math>  <math>height(C) = height(D) + height(B)</math> </p>
 <p style="margin-left: 20px;"> <math>x(C) = x(B)</math>  <math>y(C) = y(B)</math>  <math>width(B) = width(C)</math>  <math>height(B) = height(C)</math> </p>	 <p style="margin-left: 20px;"> <math>x(Cell) = x(D)</math>  <math>y(Cell) = y(D)</math>  <math>width(D) = WIDTH\_cell</math>  <math>height(D) = HEIGHT\_cell</math> </p>
 <p style="margin-left: 20px;"> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>x(B) = x(C)</math>  <math>y(B) = y(C) + height(D)</math>  <math>width(C) = \max(width(D), width(B))</math>  <math>height(C) = height(D) + height(B)</math> </p>	 <p style="margin-left: 20px;"> <math>x(C) = x(D)</math>  <math>y(C) = y(D)</math>  <math>width(D) = width(C)</math>  <math>height(D) = height(C)</math> </p>
 <p style="margin-left: 20px;"> <math>x(Cell) = x(D)</math>  <math>y(Cell) = y(D)</math>  <math>width(D) = WIDTH\_cell</math>  <math>height(D) = HEIGHT\_cell</math> </p>	 <p style="margin-left: 20px;"> <math>x(Cell) = x(D)</math>  <math>y(Cell) = y(D)</math>  <math>width(D) = WIDTH\_cell</math>  <math>height(D) = HEIGHT\_cell</math> </p>
 <p style="margin-left: 20px;"> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>x(B) = x(C)</math>  <math>y(B) = y(C) + height(D)</math>  <math>width(C) = \max(width(D), width(B))</math>  <math>height(C) = height(D) + height(B)</math> </p>	 <p style="margin-left: 20px;"> <math>x(C) = x(D)</math>  <math>y(C) = y(D)</math>  <math>width(D) = width(C)</math>  <math>height(D) = height(C)</math> </p>

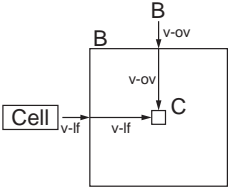
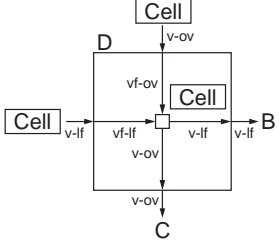
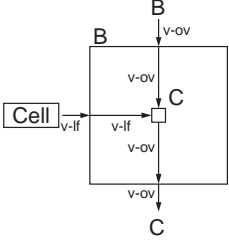
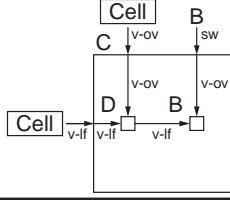
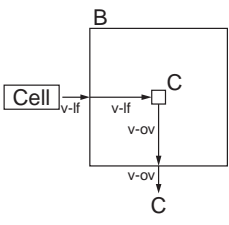
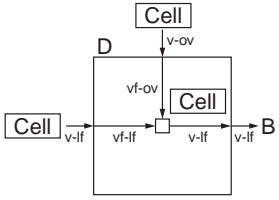
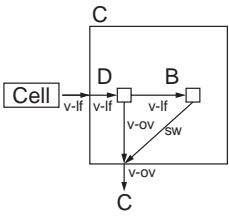
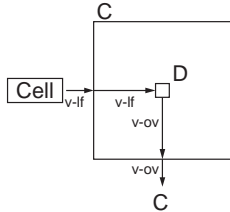
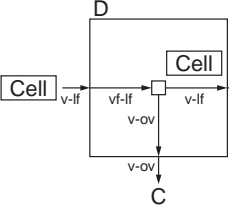
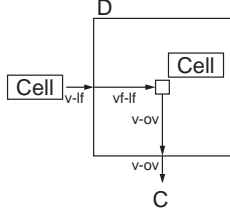
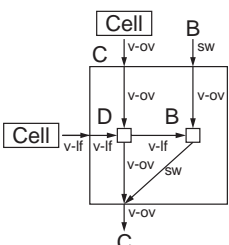
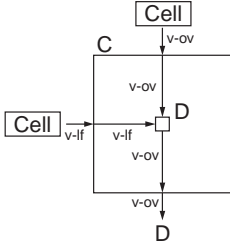
Productions and Semantic Rules for Tessellation Forms (Horizontal Derivation 3)

<p> <math>x(\text{Cell}) = x(D)</math>  <math>y(\text{Cell}) = y(D)</math>  <math>\text{width}(D) = \text{WIDTH\_cell}</math>  <math>\text{height}(D) = \text{HEIGHT\_cell}</math> </p>	<p> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>\text{width}(C) = \text{width}(D)</math>  <math>\text{height}(C) = \text{height}(D)</math> </p>
<p> <math>x(C) = x(D)</math>  <math>y(C) = y(D)</math>  <math>\text{width}(D) = \text{width}(C)</math>  <math>\text{height}(D) = \text{height}(C)</math> </p>	<p> <math>x(\text{Cell}) = x(D)</math>  <math>y(\text{Cell}) = y(D)</math>  <math>\text{width}(D) = \text{WIDTH\_cell}</math>  <math>\text{height}(D) = \text{HEIGHT\_cell}</math> </p>
<p> <math>x(\text{Cell}) = x(D)</math>  <math>y(\text{Cell}) = y(D)</math>  <math>\text{width}(D) = \text{WIDTH\_cell}</math>  <math>\text{height}(D) = \text{HEIGHT\_cell}</math> </p>	<p> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>\text{width}(C) = \text{width}(D)</math>  <math>\text{height}(C) = \text{height}(D)</math> </p>
<p> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>\text{width}(C) = \text{width}(D)</math>  <math>\text{height}(C) = \text{height}(D)</math> </p>	<p> <math>x(\text{Cell}) = x(D)</math>  <math>y(\text{Cell}) = y(D)</math>  <math>\text{width}(D) = \text{WIDTH\_cell}</math>  <math>\text{height}(D) = \text{HEIGHT\_cell}</math> </p>
<p> <math>x(\text{Cell}) = x(D)</math>  <math>y(\text{Cell}) = y(D)</math>  <math>\text{width}(D) = \text{WIDTH\_cell}</math>  <math>\text{height}(D) = \text{HEIGHT\_cell}</math> </p>	<p> <math>x(\text{Cell}) = 0</math>  <math>y(\text{Cell}) = 0</math>  <math>\text{width}(S) = \text{WIDTH\_cell}</math>  <math>\text{height}(S) = \text{HEIGHT\_cell}</math> </p>

# Productions and Semantic Rules for Tessellation Forms (Vertical Derivation 1)

<p><b>S</b></p>  <p> <math>x(V) = 0</math>  <math>y(V) = 0</math>  <math>width(S) = width(V)</math>  <math>height(S) = height(V)</math> </p>	<p><b>C</b></p>  <p> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>x(B) = x(C) + width(D)</math>  <math>y(B) = y(C)</math>  <math>width(C) = width(D) + width(B)</math>  <math>height(C) = \max( height(D), height(B) )</math> </p>
<p><b>V</b></p>  <p> <math>x(B) = x(V)</math>  <math>y(B) = y(V)</math>  <math>x(A) = x(V)</math>  <math>y(A) = y(V) + height(B)</math>  <math>width(V) = \max( width(B), width(A) )</math>  <math>height(V) = height(B) + height(A)</math> </p>	<p><b>D</b></p>  <p> <math>x(Cell) = x(D)</math>  <math>y(Cell) = y(D)</math>  <math>width(D) = WIDTH\_cell</math>  <math>height(D) = HEIGHT\_cell</math> </p>
<p><b>A<sub>0</sub></b></p>  <p> <math>x(B) = x(A_0)</math>  <math>y(B) = y(A_0)</math>  <math>x(A_1) = x(A_0)</math>  <math>y(A_1) = y(A_0) + height(B)</math>  <math>width(A_0) = \max( width(B), width(A_1) )</math>  <math>height(A_0) = height(B) + height(A_1)</math> </p>	<p><b>Cell</b></p>  <p> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>x(B) = x(C) + width(D)</math>  <math>y(B) = y(C)</math>  <math>width(C) = width(D) + width(B)</math>  <math>height(C) = \max( height(D), height(B) )</math> </p>
<p><b>A</b></p>  <p> <math>x(B) = x(A)</math>  <math>y(B) = y(A)</math>  <math>width(A) = width(B)</math>  <math>height(A) = height(B)</math> </p>	<p><b>Cell</b></p>  <p> <math>x(Cell) = x(D)</math>  <math>y(Cell) = y(D)</math>  <math>width(D) = WIDTH\_cell</math>  <math>height(D) = HEIGHT\_cell</math> </p>
<p><b>B</b></p>  <p> <math>x(C) = x(B)</math>  <math>y(C) = y(B)</math>  <math>width(B) = width(A)</math>  <math>height(B) = height(A)</math> </p>	<p><b>Cell</b></p>  <p> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>x(B) = x(C) + width(D)</math>  <math>y(B) = y(C)</math>  <math>width(C) = width(D) + width(B)</math>  <math>height(C) = \max( height(D), height(B) )</math> </p>
<p><b>B</b></p>  <p> <math>x(C) = x(B)</math>  <math>y(C) = y(B)</math>  <math>width(B) = width(A)</math>  <math>height(B) = height(A)</math> </p>	<p><b>Cell</b></p>  <p> <math>x(Cell) = x(D)</math>  <math>y(Cell) = y(D)</math>  <math>width(D) = WIDTH\_cell</math>  <math>height(D) = HEIGHT\_cell</math> </p>

## Productions and Semantic Rules for Tessellation Forms (Vertical Derivation 2)

 <p style="margin-left: 40px;"> <math>x(C) = x(B)</math>  <math>y(C) = y(B)</math>  <math>width(B) = width(C)</math>  <math>height(B) = height(C)</math> </p>	 <p style="margin-left: 40px;"> <math>x(Cell) = x(D)</math>  <math>y(Cell) = y(D)</math>  <math>width(D) = WIDTH\_cell</math>  <math>height(D) = HEIGHT\_cell</math> </p>
 <p style="margin-left: 40px;"> <math>x(C) = x(B)</math>  <math>y(C) = y(B)</math>  <math>width(B) = width(C)</math>  <math>height(B) = height(C)</math> </p>	 <p style="margin-left: 40px;"> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>x(B) = x(C) + width(D)</math>  <math>y(B) = y(C)</math>  <math>width(C) = width(D) + width(B)</math>  <math>height(C) = \max( height(D), height(B) )</math> </p>
 <p style="margin-left: 40px;"> <math>x(C) = x(B)</math>  <math>y(C) = y(B)</math>  <math>width(B) = width(C)</math>  <math>height(B) = height(C)</math> </p>	 <p style="margin-left: 40px;"> <math>x(Cell) = x(D)</math>  <math>y(Cell) = y(D)</math>  <math>width(D) = WIDTH\_cell</math>  <math>height(D) = HEIGHT\_cell</math> </p>
 <p style="margin-left: 40px;"> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>x(B) = x(C) + width(D)</math>  <math>y(B) = y(C)</math>  <math>width(C) = width(D) + width(B)</math>  <math>height(C) = \max( height(D), height(B) )</math> </p>	 <p style="margin-left: 40px;"> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>width(C) = width(D)</math>  <math>height(C) = height(D)</math> </p>
 <p style="margin-left: 40px;"> <math>x(Cell) = x(D)</math>  <math>y(Cell) = y(D)</math>  <math>width(D) = WIDTH\_cell</math>  <math>height(D) = HEIGHT\_cell</math> </p>	 <p style="margin-left: 40px;"> <math>x(Cell) = x(D)</math>  <math>y(Cell) = y(D)</math>  <math>width(D) = WIDTH\_cell</math>  <math>height(D) = HEIGHT\_cell</math> </p>
 <p style="margin-left: 40px;"> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>x(B) = x(C) + width(D)</math>  <math>y(B) = y(C)</math>  <math>width(C) = width(D) + width(B)</math>  <math>height(C) = \max( height(D), height(B) )</math> </p>	 <p style="margin-left: 40px;"> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>width(C) = width(D)</math>  <math>height(C) = height(D)</math> </p>

### Productions and Semantic Rules for Tessellation Forms (Vertical Derivation 3)

<p> <math>x(\text{Cell}) = x(D)</math>  <math>y(\text{Cell}) = y(D)</math>  <math>\text{width}(D) = \text{WIDTH\_cell}</math>  <math>\text{height}(D) = \text{HEIGHT\_cell}</math> </p>	<p> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>\text{width}(C) = \text{width}(D)</math>  <math>\text{height}(C) = \text{height}(D)</math> </p>
<p> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>\text{width}(C) = \text{width}(D)</math>  <math>\text{height}(C) = \text{height}(D)</math> </p>	<p> <math>x(\text{Cell}) = x(D)</math>  <math>y(\text{Cell}) = y(D)</math>  <math>\text{width}(D) = \text{WIDTH\_cell}</math>  <math>\text{height}(D) = \text{HEIGHT\_cell}</math> </p>
<p> <math>x(\text{Cell}) = x(D)</math>  <math>y(\text{Cell}) = y(D)</math>  <math>\text{width}(D) = \text{WIDTH\_cell}</math>  <math>\text{height}(D) = \text{HEIGHT\_cell}</math> </p>	<p> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>\text{width}(C) = \text{width}(D)</math>  <math>\text{height}(C) = \text{height}(D)</math> </p>
<p> <math>x(D) = x(C)</math>  <math>y(D) = y(C)</math>  <math>\text{width}(C) = \text{width}(D)</math>  <math>\text{height}(C) = \text{height}(D)</math> </p>	<p> <math>x(\text{Cell}) = x(D)</math>  <math>y(\text{Cell}) = y(D)</math>  <math>\text{width}(D) = \text{WIDTH\_cell}</math>  <math>\text{height}(D) = \text{HEIGHT\_cell}</math> </p>
<p> <math>x(\text{Cell}) = x(D)</math>  <math>y(\text{Cell}) = y(D)</math>  <math>\text{width}(D) = \text{WIDTH\_cell}</math>  <math>\text{height}(D) = \text{HEIGHT\_cell}</math> </p>	