Tree Connector Pattern Study

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November 12, 2020
mint.flatland3.tn.2
Version 0.5

MODEL INTEGRATION, LLC

Change Log

Version	Date	Changes	Modified by
0.4	July 6, 2020	Initial patterns	Leon Starr
0.5	Nov 12, 2020	Layout grammar added	Leon Starr

Pattern 1

We start with a simple pattern of one Trunk Stem and two Leaf Stems

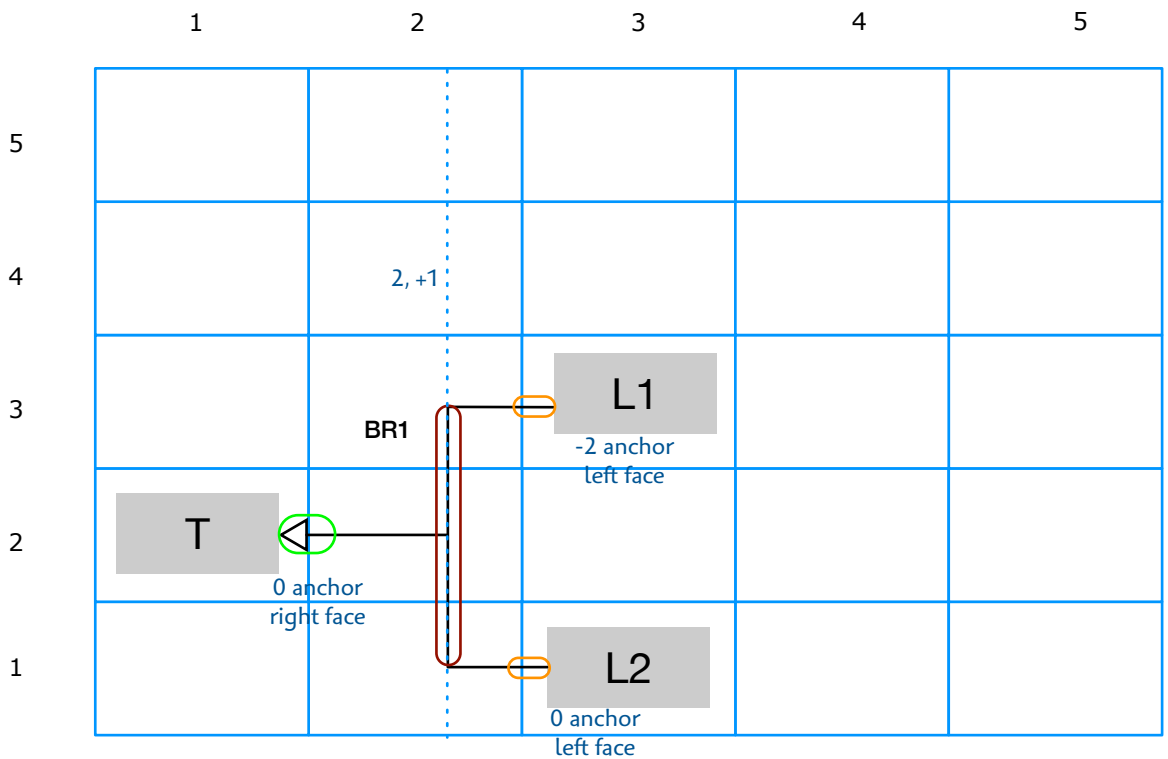
Trunk Stem

Anchored Leaf Stem

Rut Branch

BR1 is a Rut Branch running through lane 2 in rut +1

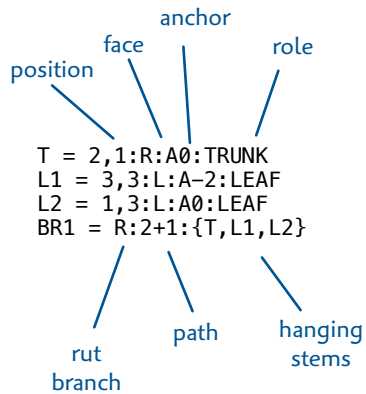
There is one trunk and two leaf stems hanging from Rut Branch BR1



Layout grammar

```
+R1 r|T { l-2|L1 l|L2 L2R+1 }
```

User specification



The user specifies the roles each Node plays (Trunk or Leaf).

For each node with a Branch Stem, where is it attached (which face and anchor position)

Finally, a Branch is specified. In this case there is only one Branch connecting all Nodes. One Node, L1, however, is special since it defines where the Branch is drawn.

Pattern 10

Single Branch where one Node (L1) attaches its Leaf Stem in line with the Branch

Layout grammar

```
+R1 r|T { b-2|L1> l|L2 l|L3 l|L4 }
```

Trunk Stem

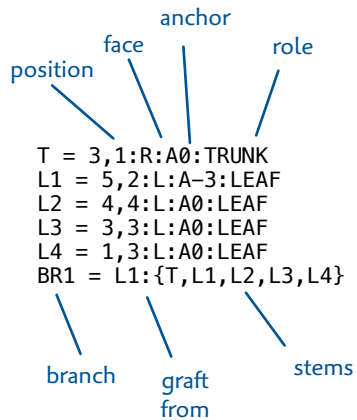
Anchored Leaf Stem

Grafting Leaf Stem

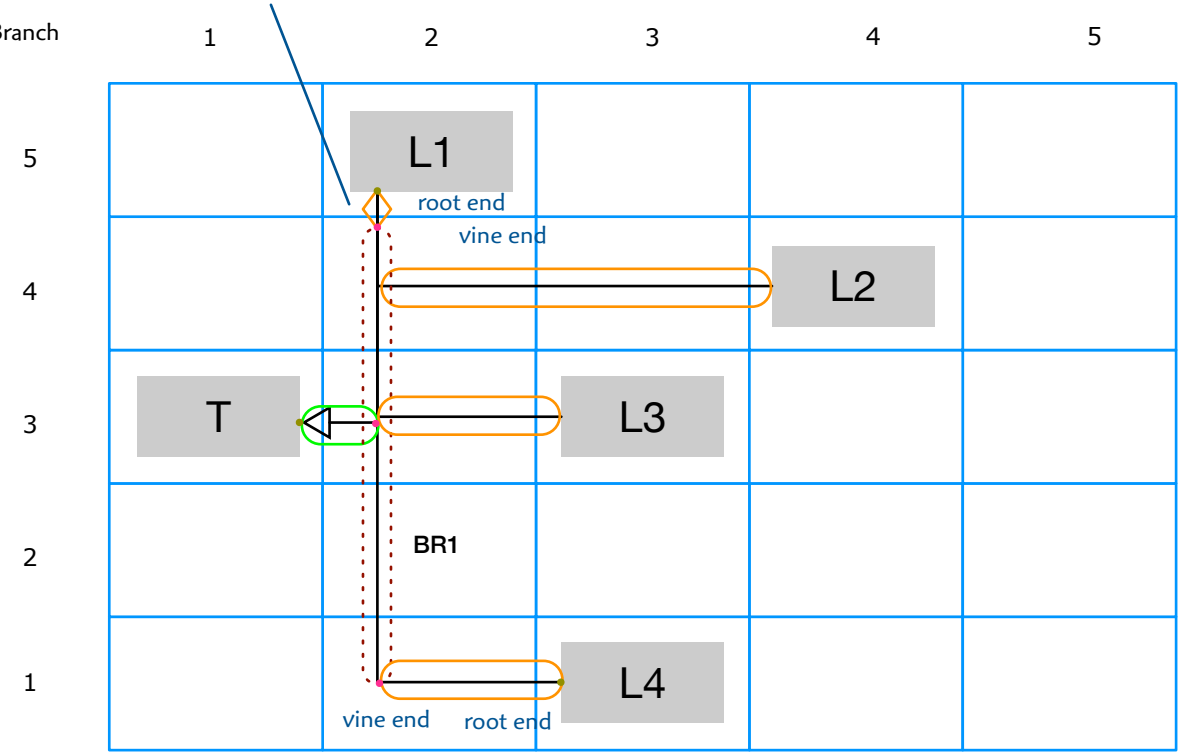
Grafted Branch

The Branch is defined as extending from L1, so L1 has a special role as "grafting" the Branch.

User specification



Since L1 grafts a Branch, its Leaf Stem extends to the default stem length specified for its notation and stem type



The Trunk and all other Leaf Stems extend to meet the single Grafted Branch

The user specifies the roles each Node plays (Trunk or Leaf).

For each node with a Branch Stem, where is it attached (which face and anchor position)

Finally, a Branch is specified. In this case there is only one Branch connecting all Nodes. One Node, L1, however, is special since it defines where the Branch is drawn.

The length of the L1 Leaf Stem is determined by the default length for its Stem Type. This length allows enough room to draw any decorations which this Stem Type does not have. So it is just a short distance. But the *x* position of the stem anchor point determines the *x* value of the BR1 branch which extends to the furthest Leaf Stem which is on L4.

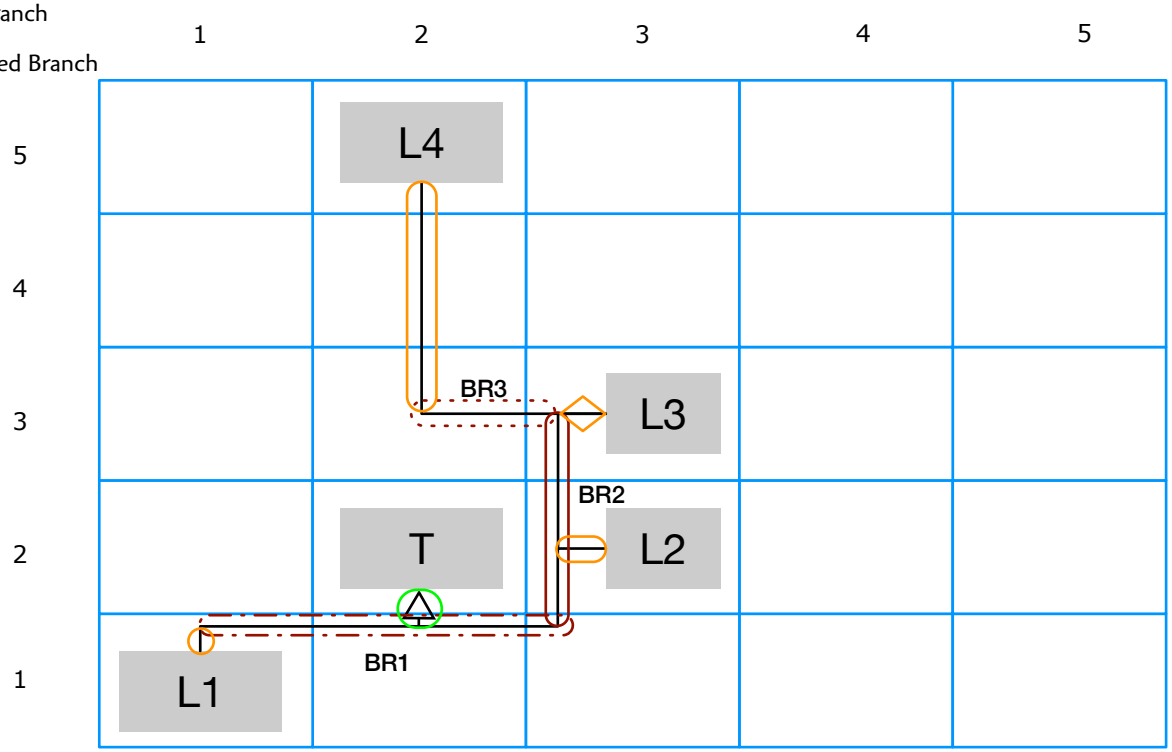
Pattern 2

Trunk Stem
Anchored Leaf Stem
Grafting Leaf Stem
Rut Branch
Grafted Branch
Interpolated Branch

Three Branches are required in this Tree Connector

Branch BR3 is grafted by Node in L3 position

Branches BR1 and BR2 are drawn to connect the Leaf Stem Vine Ends



Trunk Stem extends to meet Branch Path

Grafting is the policy of establishing the axis of a Branch Path by extending the vine end of an Anchored Stem. Note that the L3 Node both extends to meet BR2 and sets the axis for BR3

Layout grammar

```
+R1 b|T { t|L1 } { l|L2 l|L3 : L3R-2 } L3>{ b|L4 }
```

User specification

```
T = 2,2:B:A0:TRUNK
L1 = 1,1:T:A0:LEAF
L2 = 2,3:L:A0:LEAF
L3 = 3,3:L:A0:LEAF
L4 = 5,2:B:A0:LEAF
BR1 = IBR::{T, L1}
BR2 = RBR:3-2:{L2, L3}
BR3 = GBR:L3:{L4}
[ BR1, BR2, BR3 ]
```

Interpolated Branch
Rut Branch lane 3, Rut -2
Grafted Branch from L3
branch sequence

The user specifies the placement of three distinct Branches.

Branch BR1 connects only the Trunk Stem and the L1 Branch Stem. The Node faces establish the need for a horizontal line. This line is drawn from the L1 stem past the T stem and stopping at the *x* axis of the next Branch, BR2.

BR2 is placed in Rut -2 within Lane 3. Node faces and the Branch sequence determines vertical or horizontal orientation of the Lane.

When there are multiple Branches they must be sequenced so that when drawing one Branch, the adjacent Branch can be located. Adjacency is what matters so that the Branches could be drawn in any order.

BR1 is positioned midway between the Trunk Stem and Branch Stem vine ends since there is no Lane specification. There will be an error if the vine ends overlap. This is called an Interpolated Branch.

Pattern 3

- Trunk Stem
- Anchored Leaf Stem
- Grafting Leaf Stem
- Floating Leaf Stem
- Rut Branch
- Grafted Branch
- Interpolated Branch

Here we have a Tree Connector with a single Branch grafted by one of the Anchored Leaf Stems with a Floating Leaf Stem on the opposite end of the Grafted Branch.

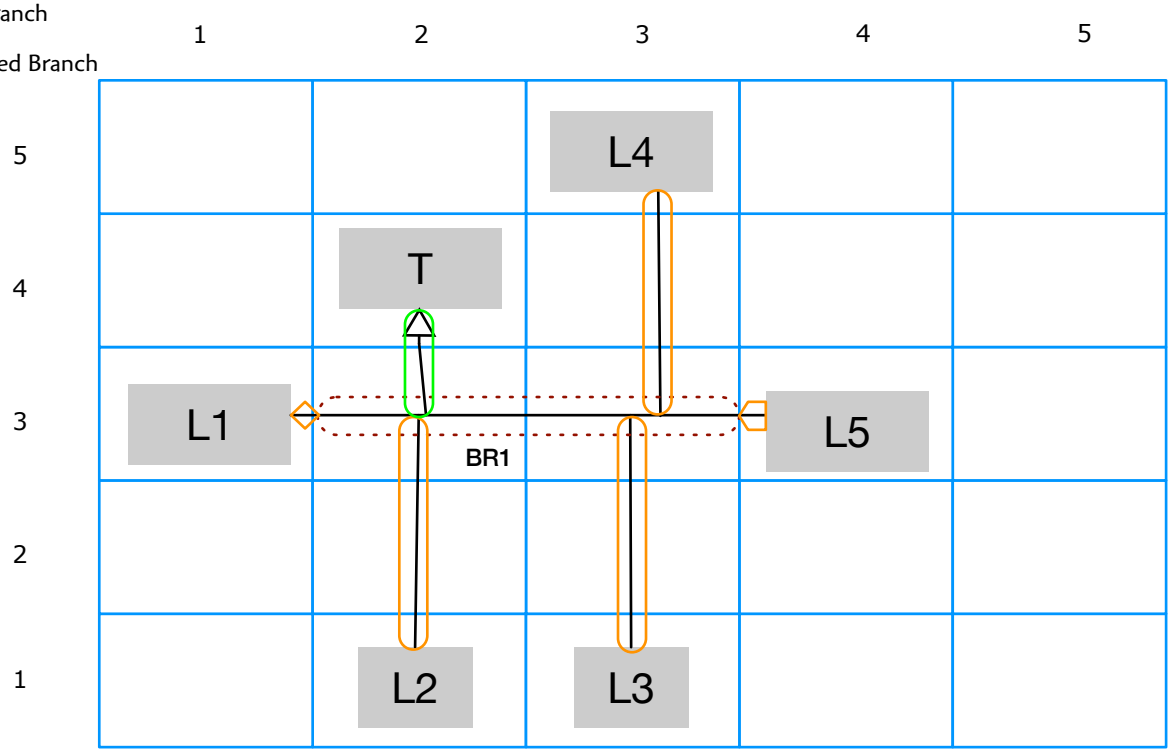
Layout grammar

```
+R1 b|T { r+1|L1> t|L2 t|L3 b|L4 l*|L5 }
```

User specification

```
T = 4,2:B:A0:TRUNK
L1 = 3,1:R:A0:LEAF
L2 = 1,2:T:A0:LEAF
L3 = 1,3:T:A0:LEAF
L4 = 5,3:B:A1:LEAF
L5 = 3,4:L:LEAF
BR1 = GBR:L1:{T,L1,L2,L3,L4}:L5
```

floats on



Trunk Stem extends to meet Branch Path

The user specifies a single Branch grafted from the Leaf Stem at L1.

Leaf Stem L5 floats on the BR1 Branch. In other words, the root end of the Leaf Stem attaches to the L5 Node face where the line from BR1 intersects the face. So L5 is a Floating rather than an Anchored Stem.

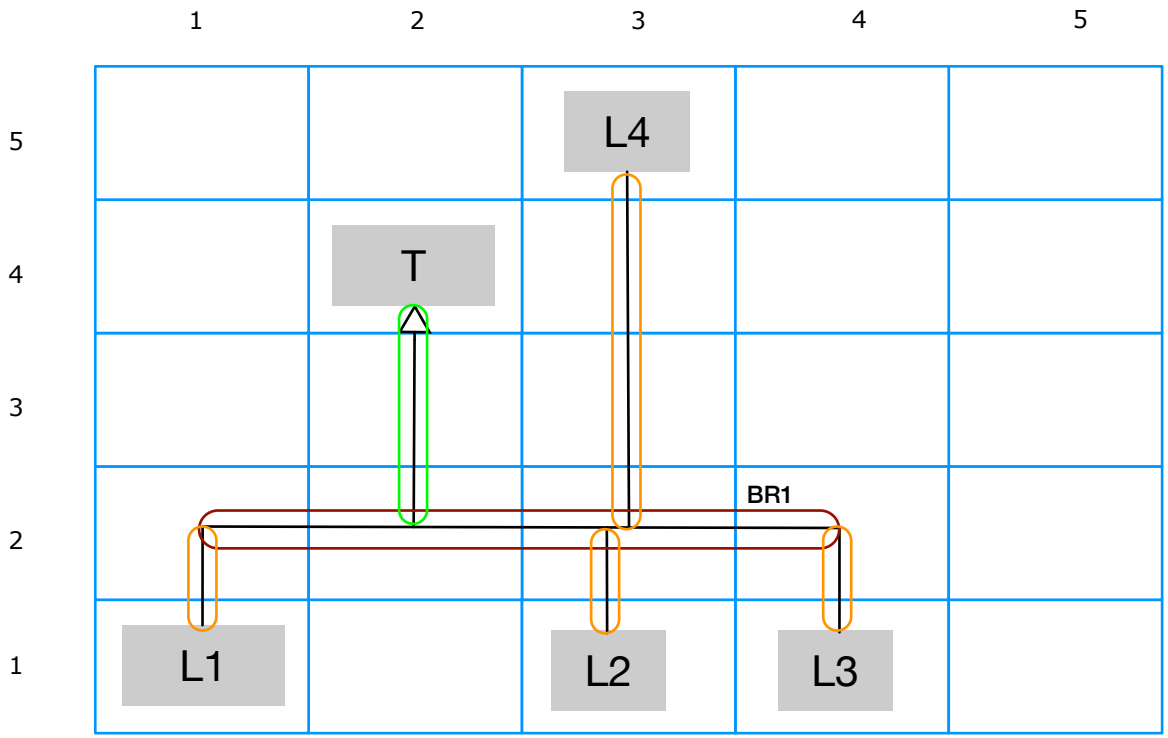
Pattern 4

The single Branch in this pattern runs through a user specified Lane and Rut.

Trunk Stem

Anchored Leaf Stem

Rut Branch



Trunk Stem extends to meet Branch BR1

Layout grammar

```
+R1 b|T { t|L1 t|L2 t|L3 b|L4 : L2R0 }
```

User specification

```
T = 4,2:B:A0:TRUNK
L1 = 1,1:T:A0:LEAF
L2 = 1,2:T:A0:LEAF
L3 = 1,4:T:A0:LEAF
L4 = 5,3:B:A0:LEAF
BR1 = RBR:2-0:{T,L1,L2,L3,L4}
```

The user has specified that Lane 2, position 0 (center) is to be used for the Branch Path.The user does not specify row or column since the lane orientation is readily determined from the Node face arrangement.

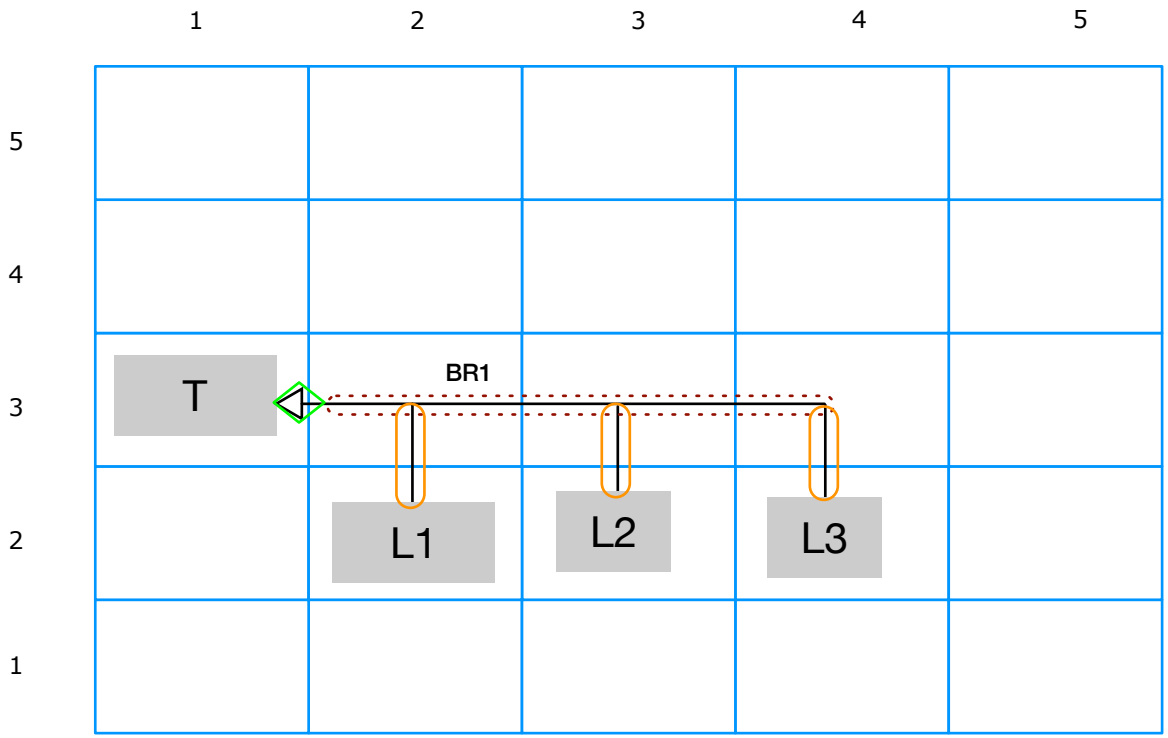
Pattern 5

The Single Branch is an extension from the Anchored Trunk Stem

Grafting Trunk Stem

Branch Stem

Grafted Branch



Leaf Stems hang from the Branch

Layout grammar

```
+R1 r|T> { t|L1 t|L2 t|L3 }
```

User specification

```
T = 3,1:R:A0:TRUNK
L1 = 2,2:T:A0:LEAF
L2 = 2,3:T:A0:LEAF
L3 = 2,4:T:A0:LEAF
BR1 = GBR:T:{T,L1,L2,L3}
```

graft from

The Branch is grafted from the Trunk Stem

Pattern 6

The Trunk Stem is the only Tree Stem in its Rut Branch.
All of the Leaf Stems hang from an adjacent Rut Branch.

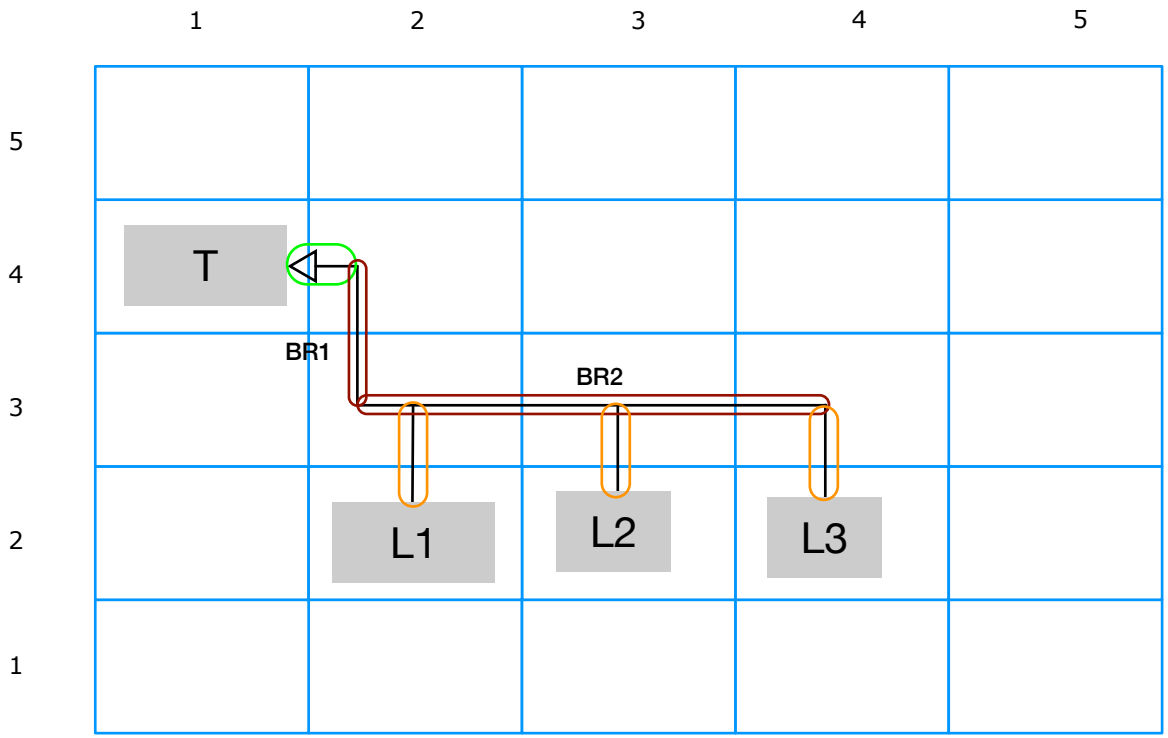
- Trunk Stem
- Anchored Leaf Stem
- Rut Branch

Layout grammar

```
+R1 r|T { L2R-2 } { t|L1 t|L2 t|L3 : L3R0 }
```

User specification

```
T = 4,1:R:A0:TRUNK
L1 = 2,2:T:A0:LEAF
L2 = 2,3:T:A0:LEAF
L3 = 2,4:T:A0:LEAF
BR1 = RBR:2-2:{T}
BR2 = RBR:3-0:{L1,L2,L3}
[ BR1, BR2 ]
```



Branch Stems hang from the Branch

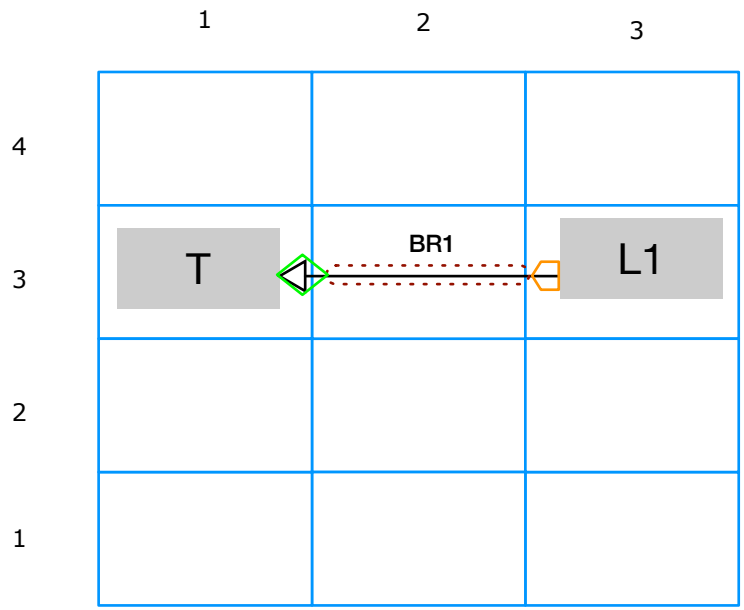
Pattern 7

Grafting Trunk Stem

Branch Stem

Grafted Branch

A minimal case with only one Anchored Tree Stem



User specification

```
T = 3,1:R:A0:TRUNK
L1 = 3,3:L:LEAF
BR1 = GBR:T:{T}:L1
```

graft from

float

The Branch is grafted from the Trunk Stem

Layout grammar

```
+R1 r|T> { l*|L1 }
```