



# Cinco Cloud – Live Metamodeling of Graphical DSLs

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# Cinco Cloud – Concept

## What?

- Holistic web-based language workbench
- **Create graphical languages** and use them immediately
- Automatically spawn Workspaces and environments

Additional: *Extensive user, project, and access management*

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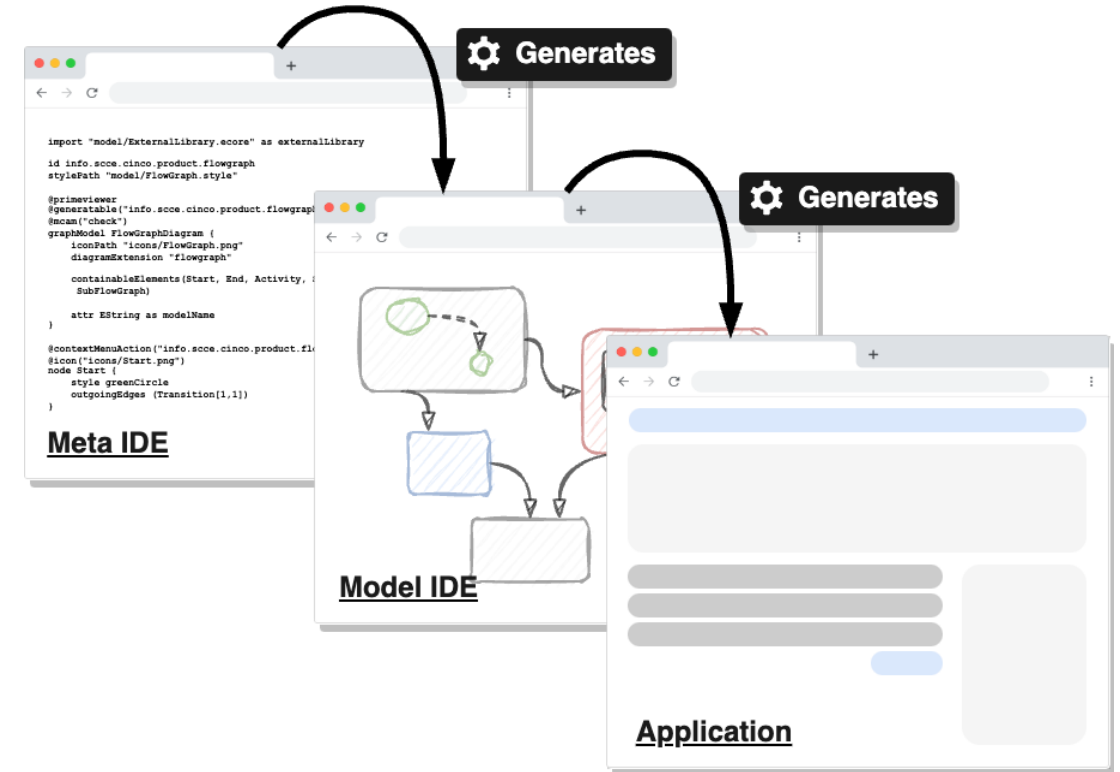


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# Cinco Cloud – Holistic

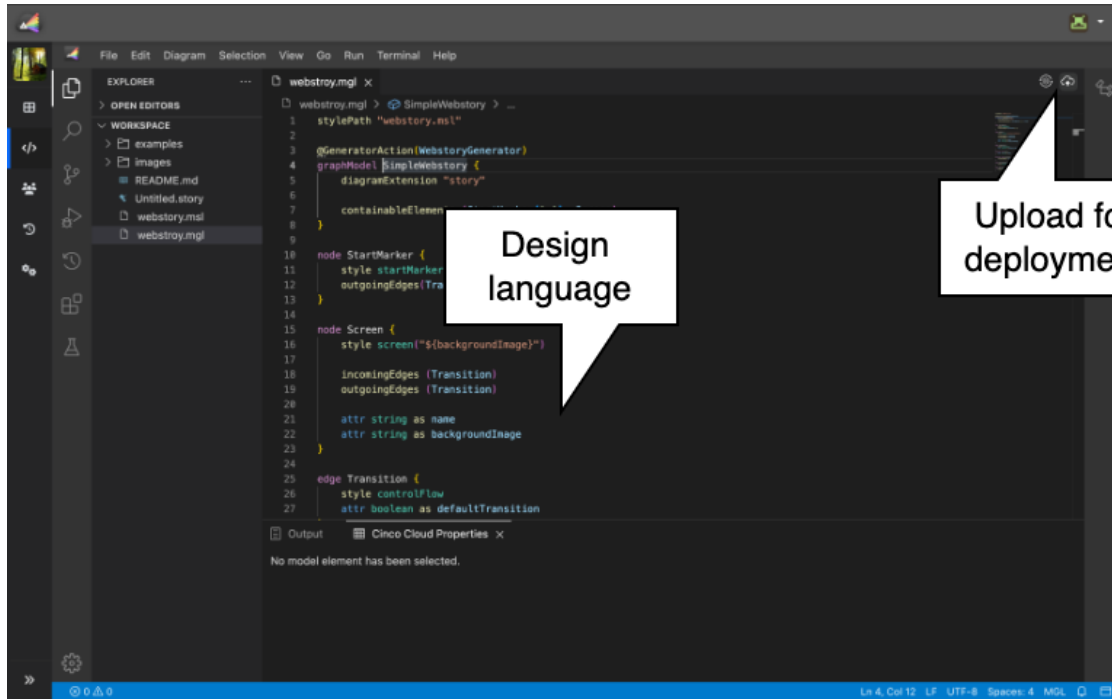
1. Design a graphical languages using meta-DSLs:
  - Meta Graph Language (MGL) – abstract syntax
  - Meta Style Language (MSL) – concrete syntax=> Implement semantics via GPL (TypeScript)
2. Use and distribute your graphical language
3. Users can generate their own application from their graphical models



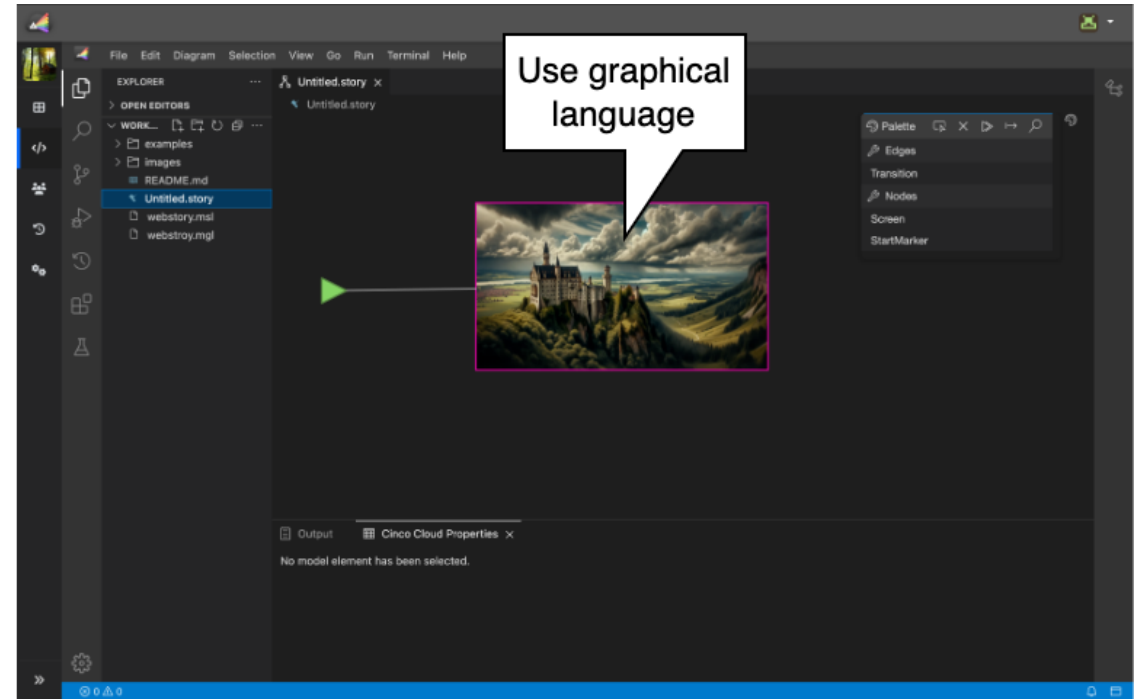
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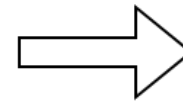
# Cinco Cloud – Holistic



Language Editor  
(For Language Engineer)



Modeling Editor  
(For Domain Expert)



Deploy Modeling Editor

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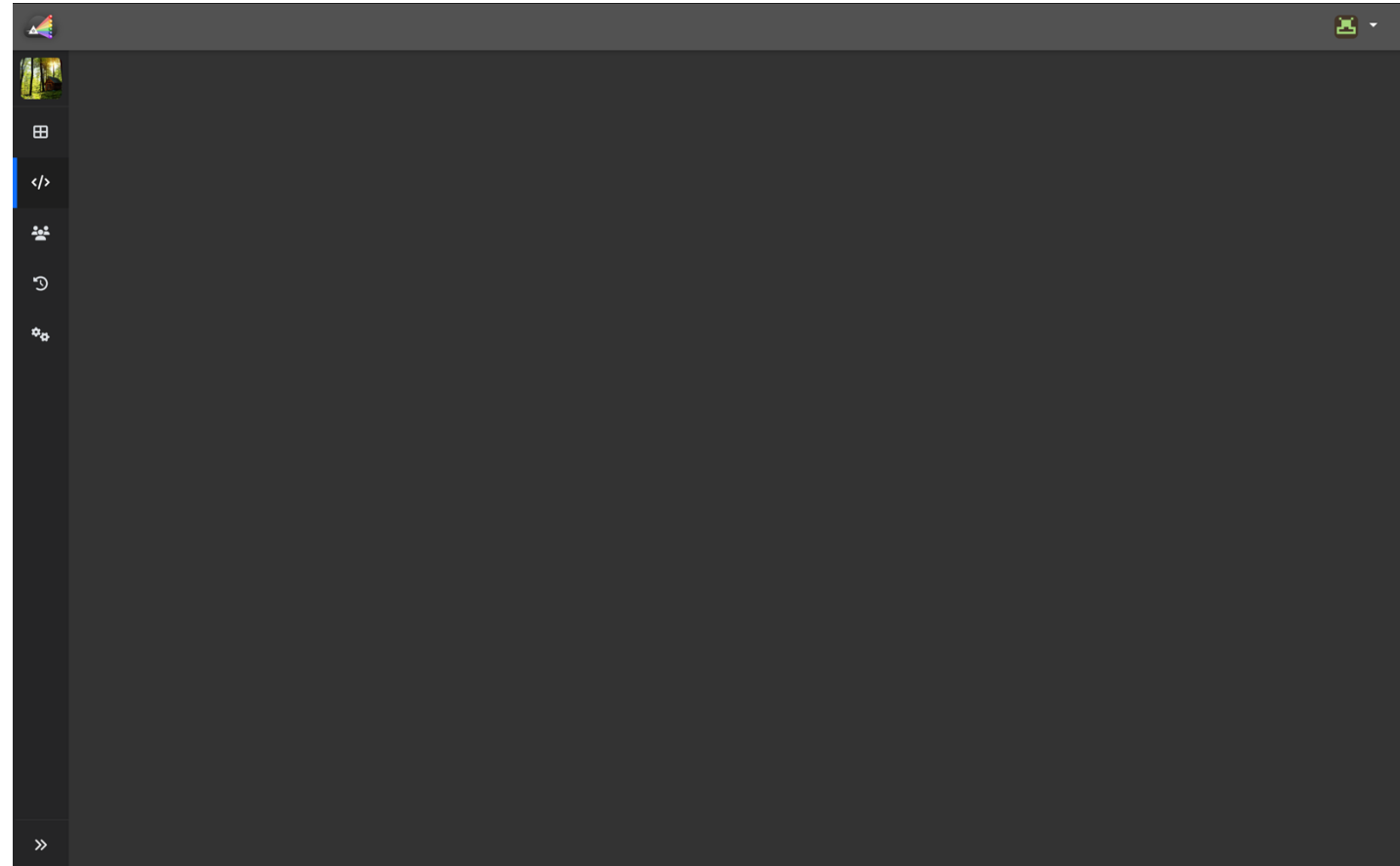


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# Cinco Cloud – Modular (Main Service)

- Extensive user, project and access management
- Spawn Workspaces and IDE environments



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# Cinco Cloud – Modular (Language Editor)

- Workspaces and IDE environments
- Development of languages and file management



*Available as docker image*

```
1 stylePath "webstory.msl"
2
3 @GeneratorAction(WebstoryGenerator)
4 graphModel SimpleWebstory {
5   diagramExtension "story"
6
7   containableElements (StartMarker[1,1], Screen)
8 }
9
10 node StartMarker {
11   style startMarker
12   outgoingEdges(Transition[1,1])
13 }
14
15 node Screen {
16   style screen("${backgroundImage}")
17
18   incomingEdges (Transition)
19   outgoingEdges (Transition)
20
21   attr string as name
22   attr string as backgroundImage
23 }
24
25 edge Transition {
26   style controlFlow
27   attr boolean as defaultTransition
```

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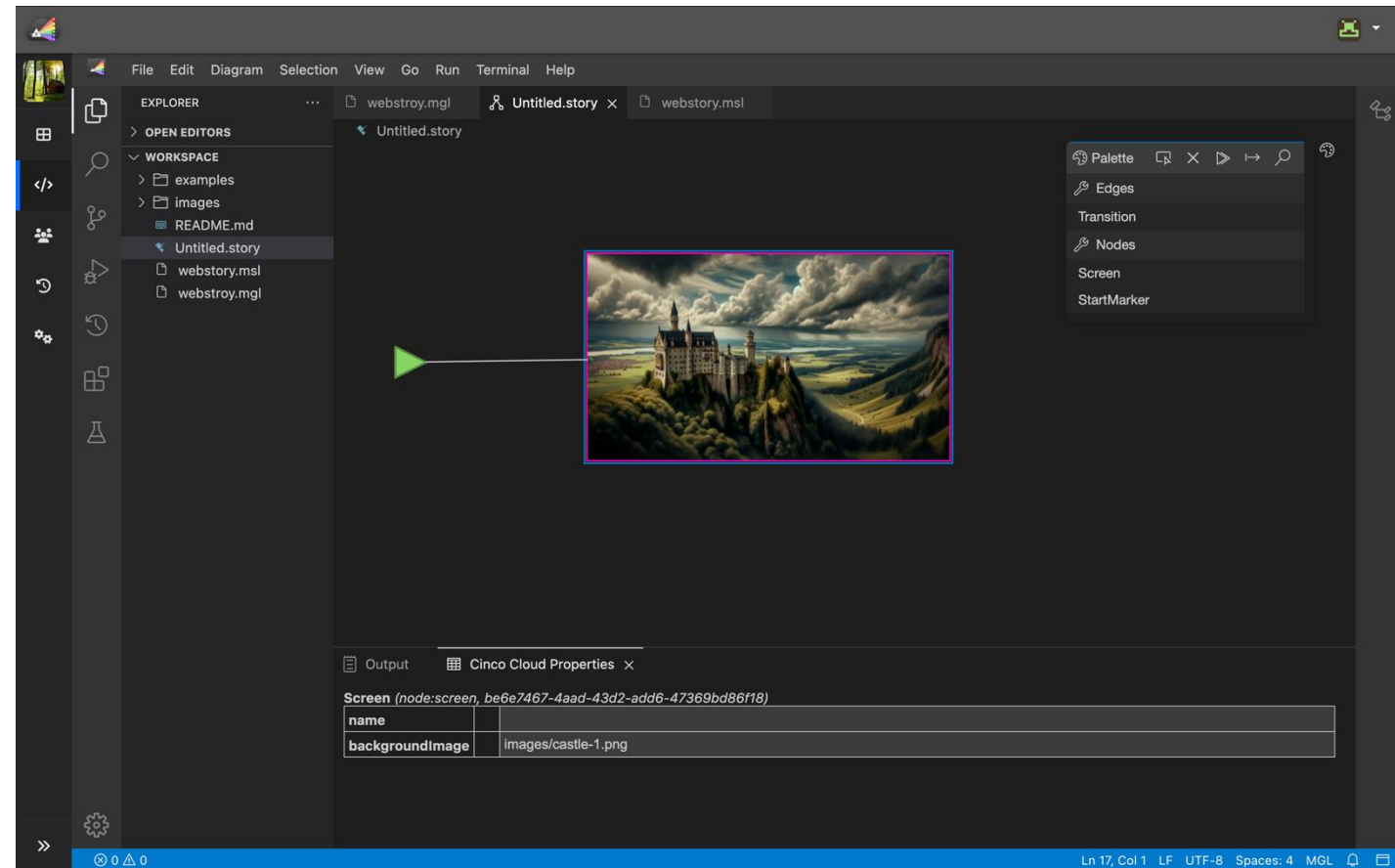


# Cinco Cloud – Modular (Modeling Canvas)

- GLSP based modeling canvas, palette, properties, validation, ...
- For modeling



*Available as standalone server*



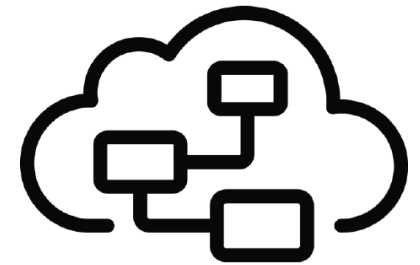
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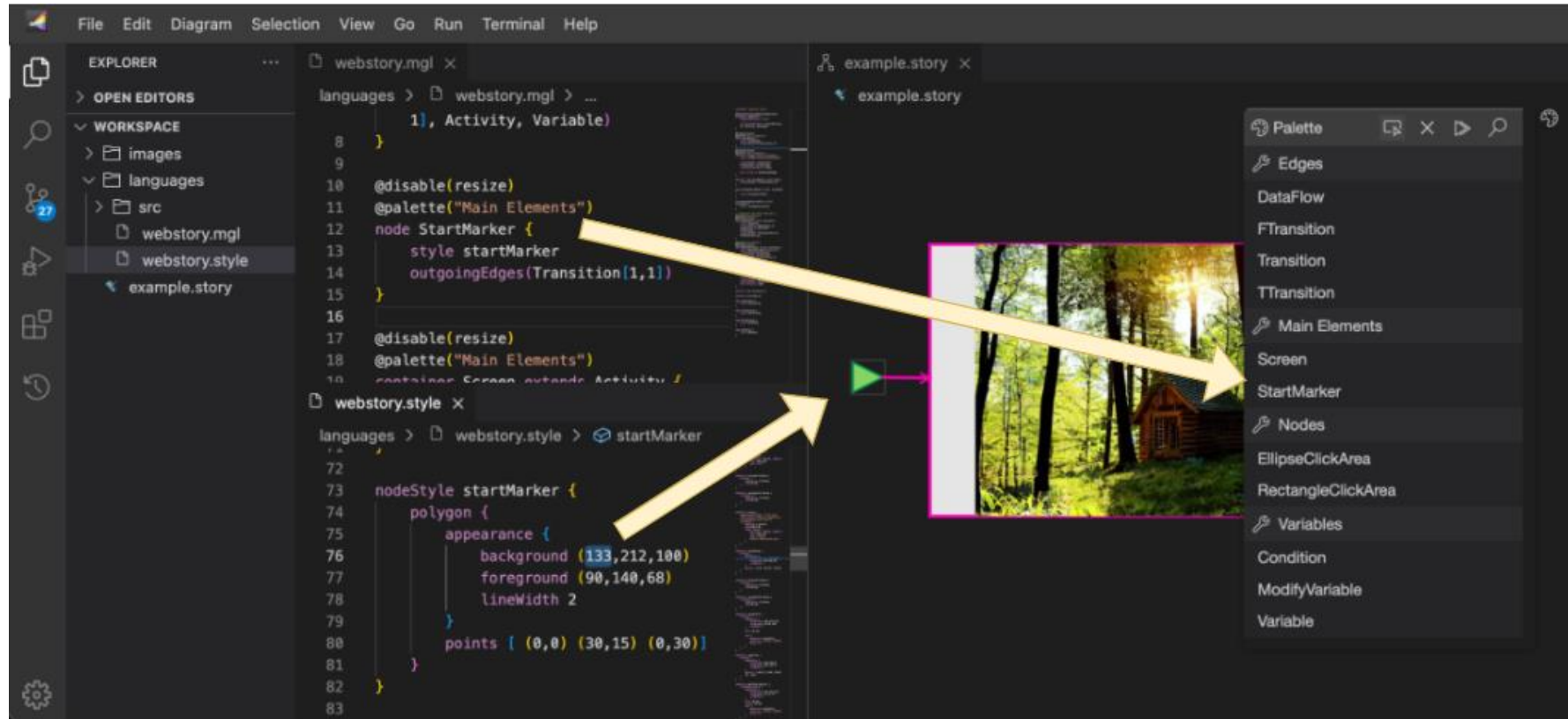


# Tech Stack





# Cinco Cloud – Live Metamodeling (Syntax)



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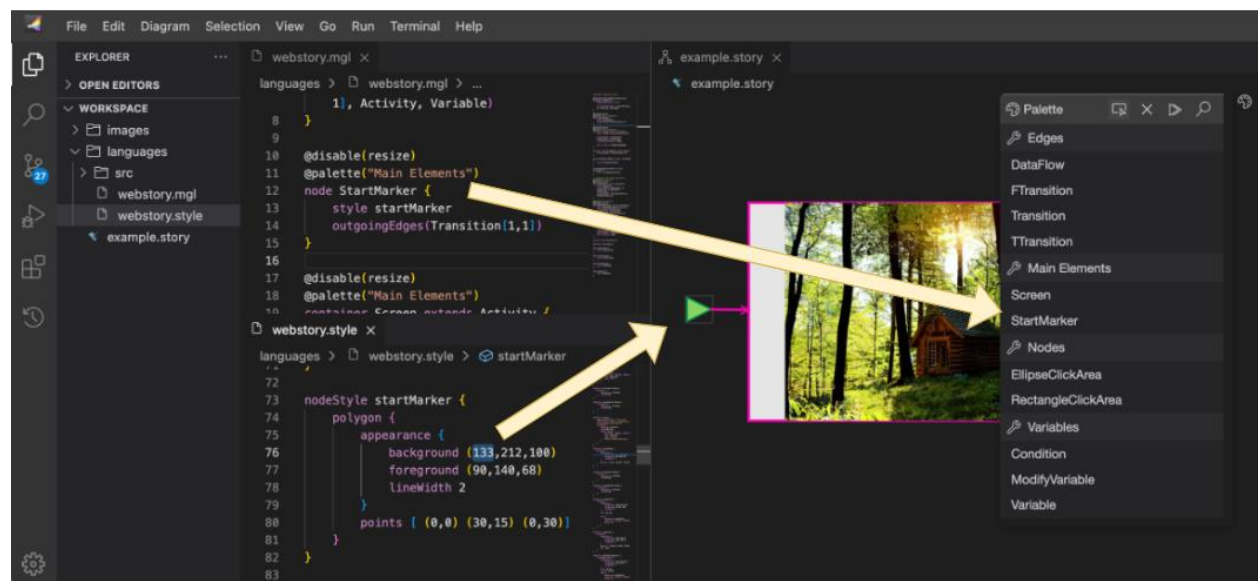


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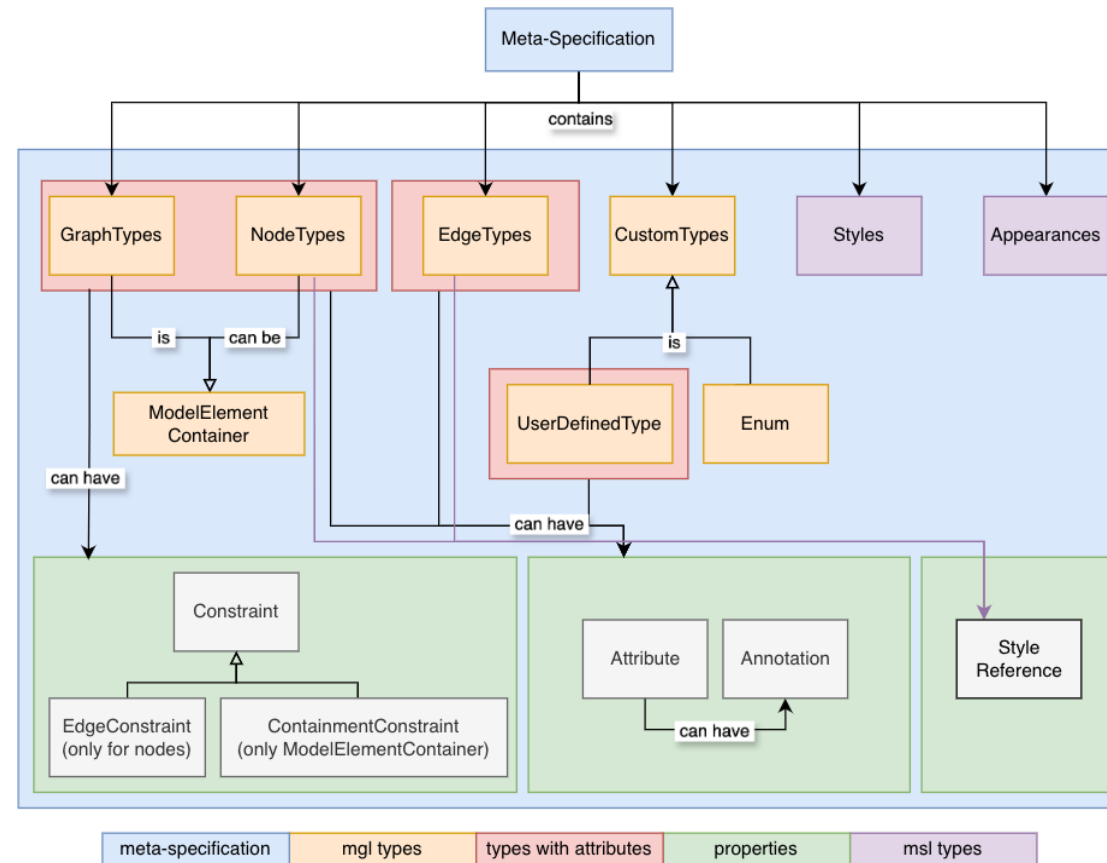
## Concept – Live Metamodeling – Challenges (Syntax)

- Instant update of canvas:
  - Palette
  - Appearance
- Instant update of constraints:
  - Containment
  - Incoming and outgoing edges
- Handling of update anomalies  
(*E.g., Model element is not part of the language anymore*)



# Cinco Cloud – Internal Structure

- Composing internal data structure
  - *Meta-Specification*
- Categorizes model element types and types of concrete syntax
- Represents a composition of metamodels
- Resolves inheriting properties:
  - constraints, attributes



# Cinco Cloud – Live Metamodeling (Semantics)

The screenshot displays the Cinco Cloud IDE interface with several components:

- EXPLORER:** Shows the project structure with folders like 'languages', 'src', and 'images'. A yellow circle with the number '3' highlights the 'generator.ts' file in the 'src' folder.
- generator.ts:** Contains TypeScript code for the 'WebstoryGenerator' class. A yellow circle with the number '2' highlights the class definition.
- webstory.mgl:** Contains MGL code for the 'Webstory' graph model. A yellow circle with the number '1' highlights the '@GeneratorAction' decorator.
- example.story:** Shows a diagram view of the generated webstory, consisting of several images connected by lines. A yellow circle with the number '4' highlights the diagram.
- Terminal:** Displays a success message: 'Generated Webstory successfully'. A yellow circle with the number '5' highlights this message.
- Navigation:** A yellow circle with the number '6' highlights the navigation icons in the bottom-left corner.

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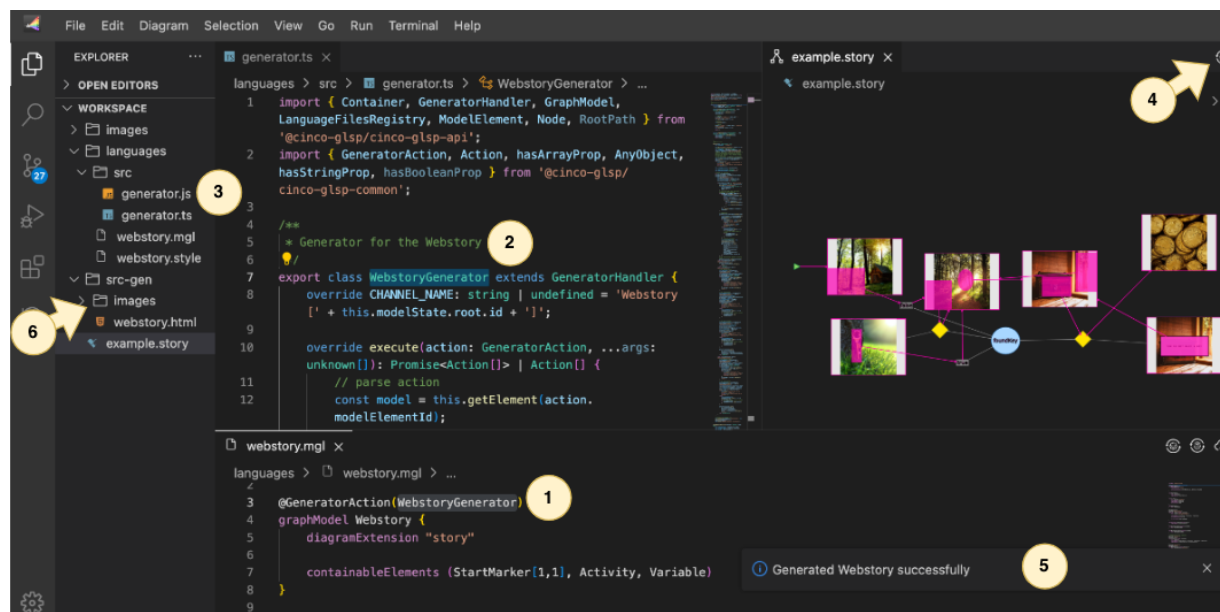


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# Concept – Live Metamodeling – Challenges (Semantics)

- Creating and updating semantics
  - File-watcher (+ Transpiler)  
+ GPL-Interpreter  
=> Real-time update of semantics



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# Concept – Live Metamodeling – Challenges (Semantics)

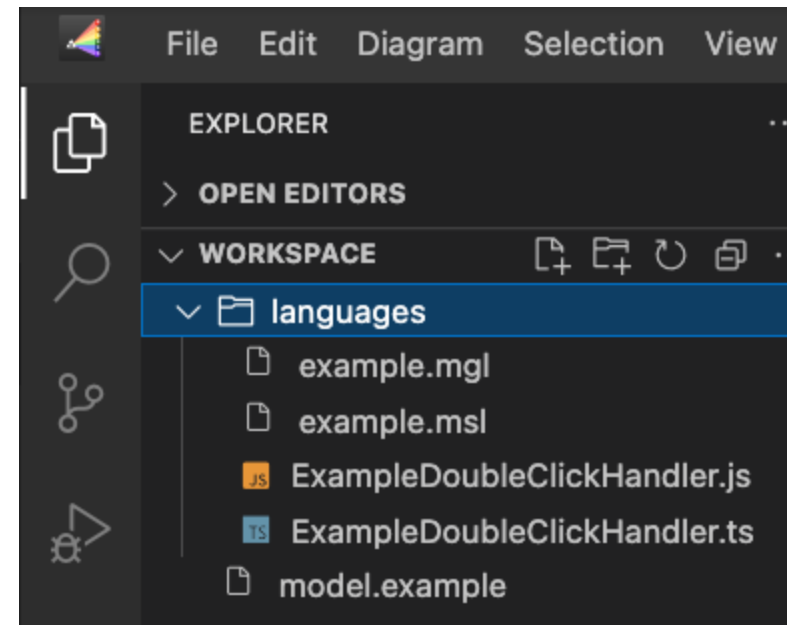
- Languages Folder
  - MGL – abstract syntax
  - MSL – concrete syntax
  - Semantic files  
(e.g., interactions, generator, validator, ...)

Language Engineer:

=> *Access to language folder  
for language design in workspace*

Domain Expert:

=> *Access-restricted language folder  
hidden from workspace*



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# Demo



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# Thank You!



Cinco Cloud  
GitLab Project

Try it out yourself!  
<https://cinco.cloud/>



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