

**JET
BRAINS**

Biological Knowledge Base

applying Web MPS in real project

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Biological Knowledge Base



- Under development now
- Independent commercial project
- Joint development of JetBrains & Genestack companies
- Based on Web MPS technology
 - Release BKB project
 - Make Web MPS technology available as a standalone product

BKB & Web MPS

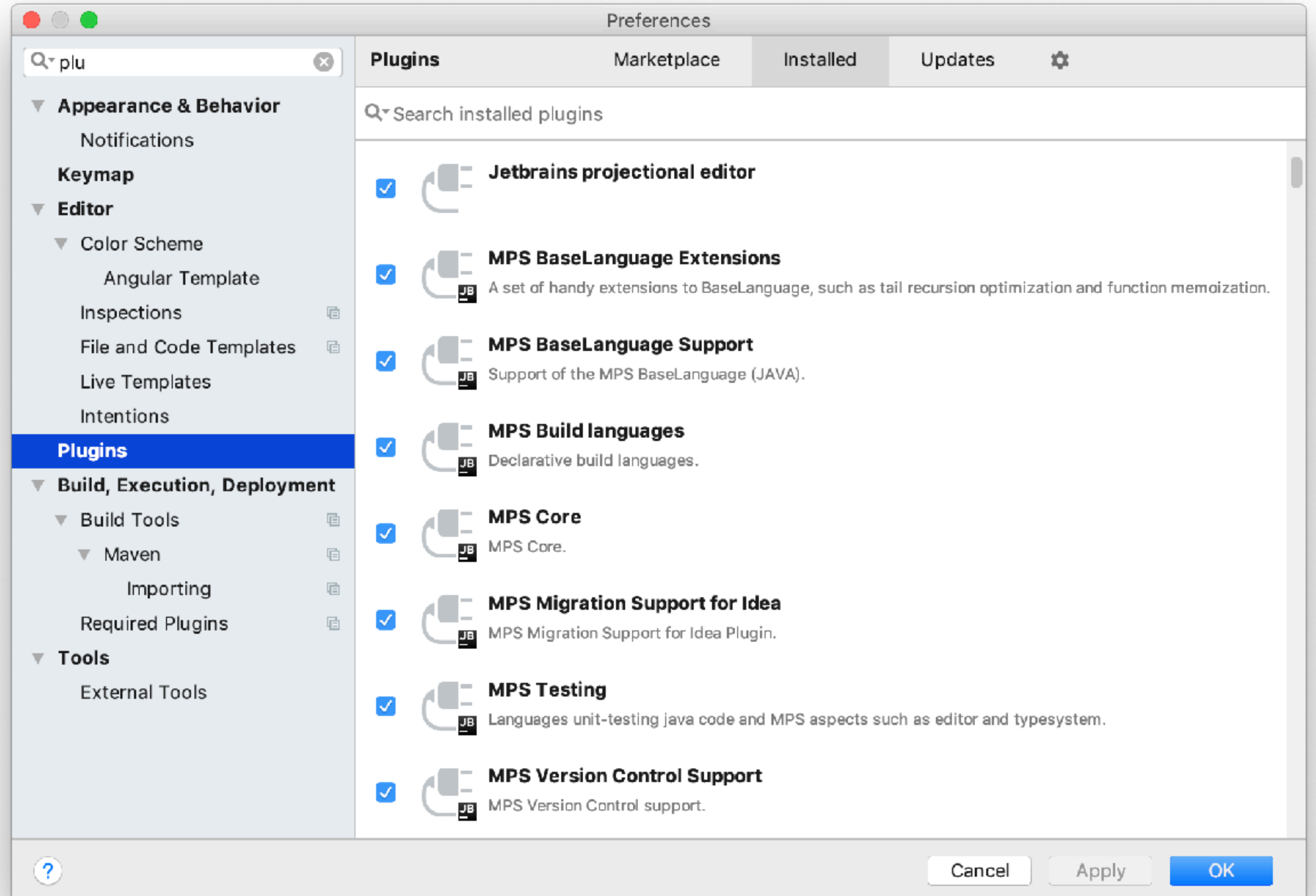
- BKB
 - DSLs for structuring knowledge in the area of biological research
 - Projectional Editor is good for non-programmers
 - There is a requirement for non-textual notations
 - Not only editor is in the area of interest
- Web MPS
 - Integration with real web application
 - Make Web-based Projectional editor mature enough
 - Define the set of most important MPS parts to include into web-story

Biological Knowledge Base application demo

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Using Web MPS

- Web MPS distributed as a plugin for IntelliJ IDEA & used
- MPS Base Language used as generation target
- GWT used to transpile Java to JS
- Saving generated java code in VCS
 - Not necessary to install Web MPS to compile the project
- Using Maven to build final application



Web MPS

Concept definition

language aspect btb

```
root concept BTBDocument {  
  Category categories [0..n];  
  OntologyImportRootReference imports [0..n];  
  FactSet factSets [0..n];  
  
  OntologyLibrary getLibraryForLink(LinkDeclaration link) =  
    this.imports.collect(it| it.root)  
      .select(it| it != null)  
      .collectFlat(it| it.imports)  
      .select(it| it.element.element == link.type.element.element)  
      .first.libraryToUse.library;  
}
```

Web MPS

Notation definition

notation BTBDocument ::

```
"categories:"#kw categories=(Category separator ",")+ \n "" \n \  
imports=(OntologyImportRootReference separator \n)+ \n "" \n \  
factSets=(FactSet separator \n)+ ;
```

notation Category ::

```
library _ "/" _ element ;
```

```
categories: Cell Compartments/cell plasma|  
  
<imports>  
  
<name>  
with(<name>:metaOntology/cell)  
  variables:  
    <variables>
```

Web MPS

Scopes

```
concept OntologyImportRootReference {  
  @useScopes  
  ref OntologyImportRoot root;  
}
```

```
scoping rule for BTBDocument from <no origin> --> scope<OntologyImportRoot>  
  new scope(LibSupport :: ontologyImportRoots(), property name)
```


Replacing GWT with Kotlin JS

- GWT is not accepted very well by web developers
- Kotlin JS is under control of JetBrains now
- Kotlin is much more modern programming language than Java
- Migration path from GWT to Kotlin
 - Migrate the Library, supporting OT & Projectional Editing, to Kotlin
 - Create a set of Kotlin-based (internal) DSLs, covering Projectional Editor definition
 - Implement current set of Projectional editors for BKB project in Kotlin
 - Review resulting code in order to understand how to generate it from MPS

Web MPS Roadmap

- Migrate library code to Kotlin
- Release BKB project based on Web MPS
- Release first version of Web MPS project with minimal subset of functionality
 - Structure
 - Queries (Behaviour)
 - Editor
 - Scopes
 - OT service
- Plan next version of Web MPS

**Thank you
for your attention**
