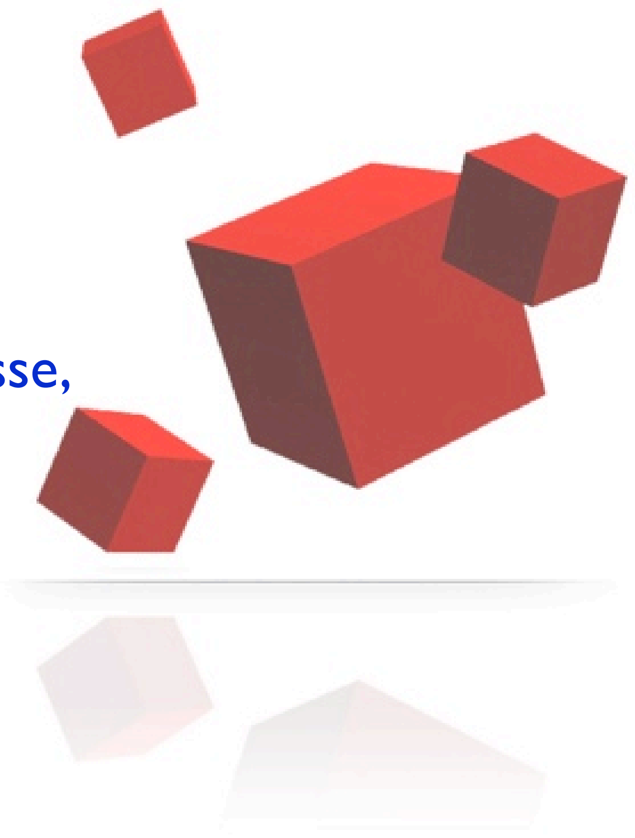
Meta-Driven Browsers



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Text

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Outline

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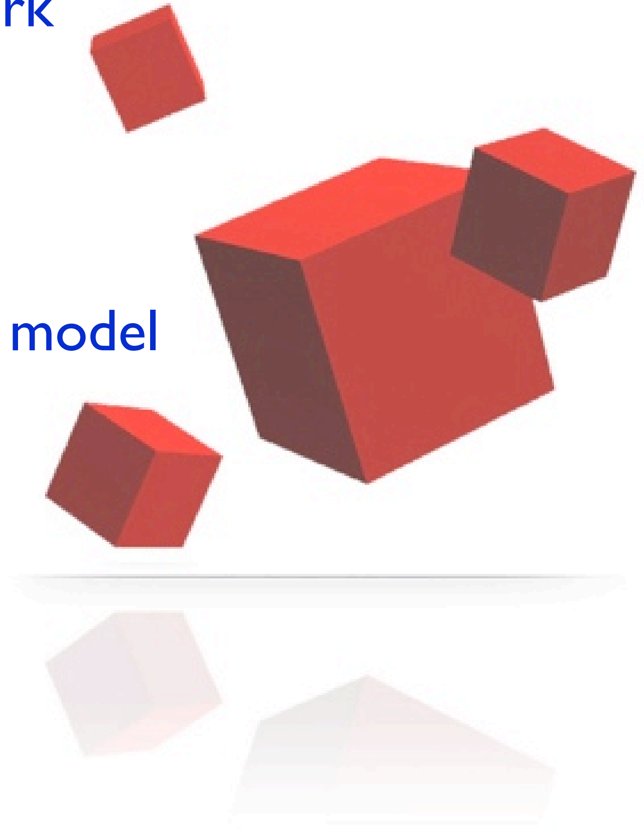


The OmniBrowser Framework

- A sophisticated framework to define new browsers
- It is structured around:
  - an explicit **domain model**
  - a **metagraph** (a state machine) that specify navigation with the domain model
  - a list of **actors** that define interactions

Domain Model: Files

```
OBNode subclass: #FileNode
  instanceVariableNames: 'path'
  ...

FileNode>>name
  ^ (FileDirectory directoryEntryFor: path) name

FileNode>>text
  ^ 'File named: ', self name
```

Domain Model: Directory

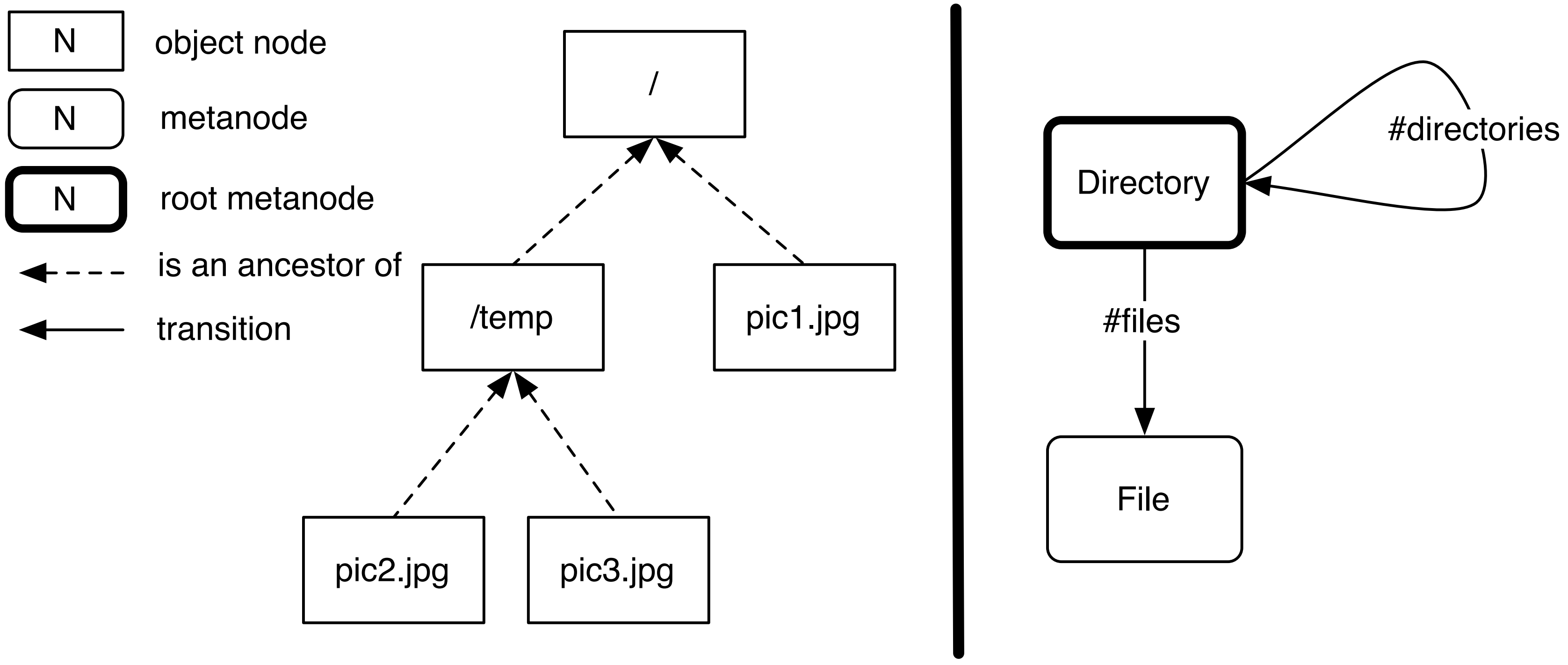
```
FileNode subclass: #DirectoryNode

DirectoryNode>>directories
  | dir |
  dir := FileDirectory on: self path.
  ^ dir directoryNames collect:
     [:each |
       DirectoryNode on: (dir fullNameFor: each)]

DirectoryNode>>files
  | dir |
  dir := FileDirectory on: self path.
  ^ dir fileNames collect: [:each |
     FileNode on: (dir fullNameFor: each)]

DirectoryNode>>text   ^ path
```

Graph and Metagraph to define browsers



(a) Instantiated domain (b) Metagraph

Metagraph and browser definition

Creation of a browser:

```
OBBrowser subclass: #FileBrowser
```

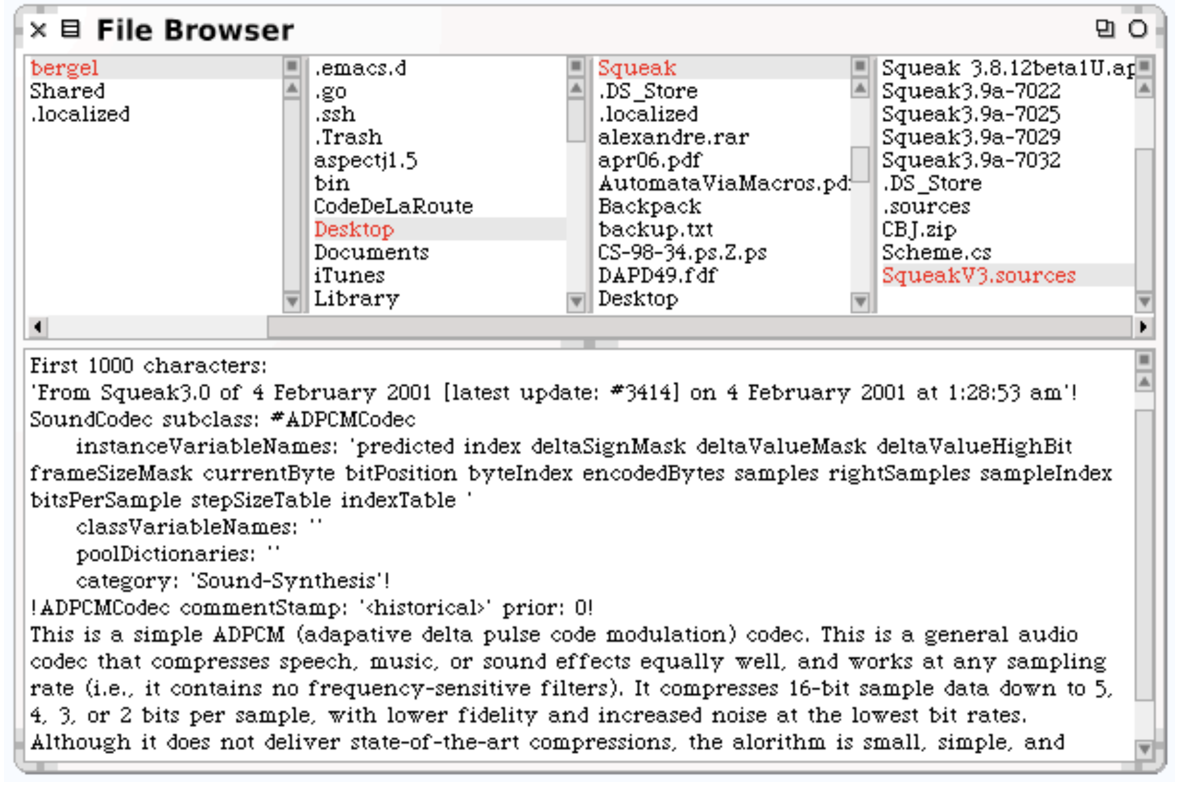
Root nodes:

```
FileBrowser>>defaultRootNode
  ^ DirectoryNode on: '/'

FileBrowser>>defaultMetaNode
  |directory file |
  directory := OBMetaNode named: 'Directory'.
  file := OBMetaNode named: 'File'.
  directory
     childAt: #directories put: directory;
     childAt: #files put: file;
     addActor: FileActor new.
  ^ directory
```

Automatic layout with columns and a pane

- The GUI is built by the framework
- It uses a layout similar to the Smalltalk System browser



```
bergel          .emacs.d        Squeak               Squeak 3.8.12beta1U.ap
Shared          .go             .DS_Store            Squeak3.9a-7022
.localized      .ssh            .localized           Squeak3.9a-7025
                .Trash          alexandre.rar        Squeak3.9a-7029
                aspectj1.5      apr06.pdf            Squeak3.9a-7032
                bin             AutomataViaMacros.pd .DS_Store
                CodeDeLaRoute   Backpack             .sources
                Desktop         backup.txt           CBJ.zip
                Documents       CS-98-34.ps.Z.ps     Scheme.cs
                iTunes          DAPD49.fdf           SqueakV3.sources
                Library         Desktop
```

```
First 1000 characters:
'From Squeak3.0 of 4 February 2001 [latest update: #3414] on 4 February 2001 at 1:28:53 am'!
SoundCodec subclass: #ADPCMCodec
    instanceVariableNames: 'predicted index deltaSignMask deltaValueMask deltaValueHighBit
frameSizeMask currentByte bitPosition byteIndex encodedBytes samples rightSamples sampleIndex
bitsPerSample stepSizeTable indexTable '
    classVariableNames: ''
    poolDictionaries: ''
    category: 'Sound-Synthesis'!
!ADPCMCodec commentStamp: '<historical>' prior: 0!
This is a simple ADPCM (adapative delta pulse code modulation) codec. This is a general audio
codec that compresses speech, music, or sound effects equally well, and works at any sampling
rate (i.e., it contains no frequency-sensitive filters). It compresses 16-bit sample data down to 5,
4, 3, or 2 bits per sample, with lower fidelity and increased noise at the lowest bit rates.
Although it does not deliver state-of-the-art compressions, the alorithm is small, simple, and
```

Interacting with the domain model with actors

An actor defines a column menu:

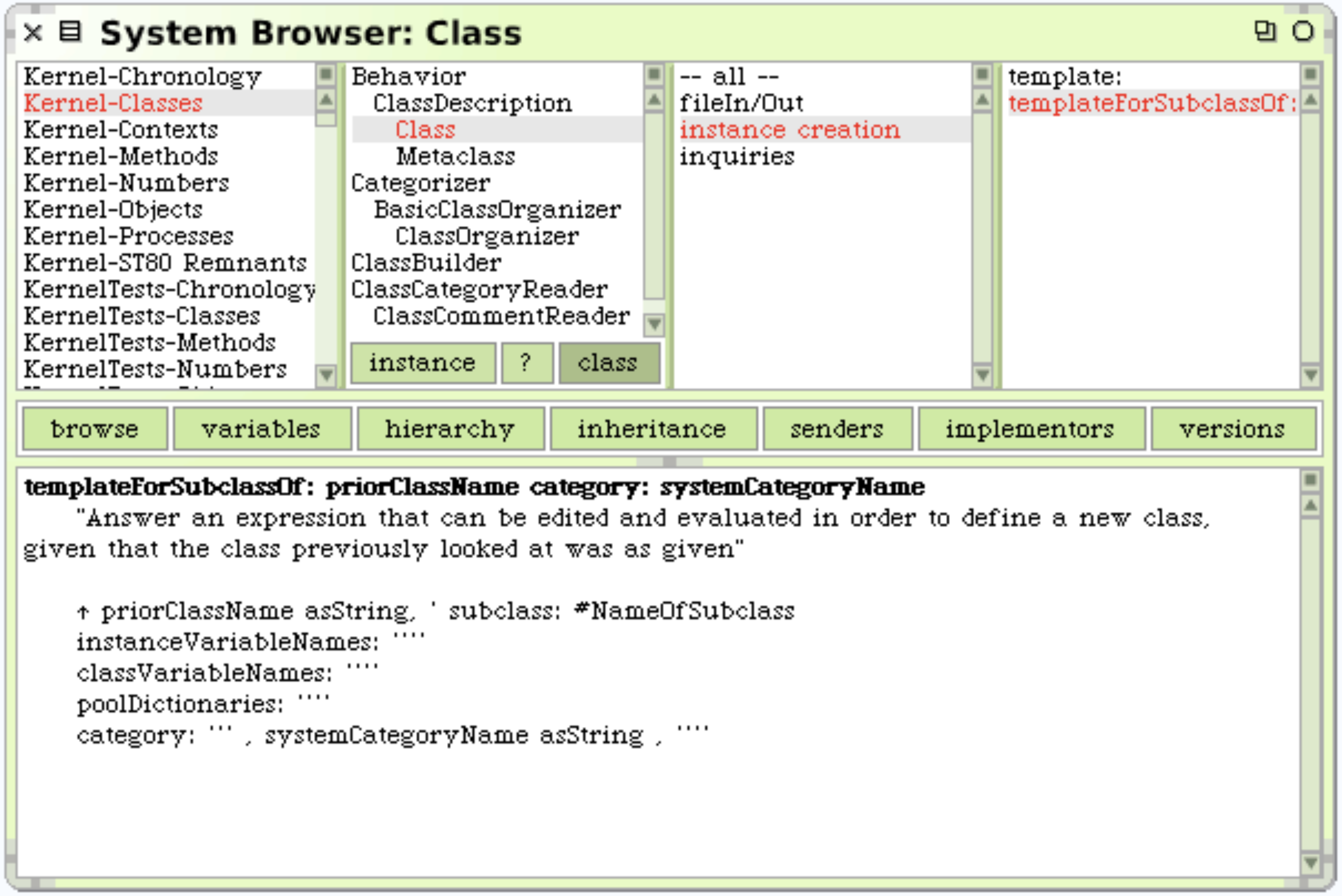
```
OBActor subclass: #FileActor

FileActor>>actionsForNode: aNode
  ^ {OBAction
       label: 'remove'
       receiver: self
       selector: #remove:
       arguments: {aNode}
       keystroke: $x
       icon: MenuIcons smallCancelIcon.
     ...}
```

Important notions of OmniBrowser

- Core notions:
  - **Nodes**: what my domain is made of?
  - **Metagraph**: how do I navigate in my domain?
  - **Actors**: how do I interact with my domain?
- Filter: filtering domain nodes
- Definition: accepting new definitions of nodes

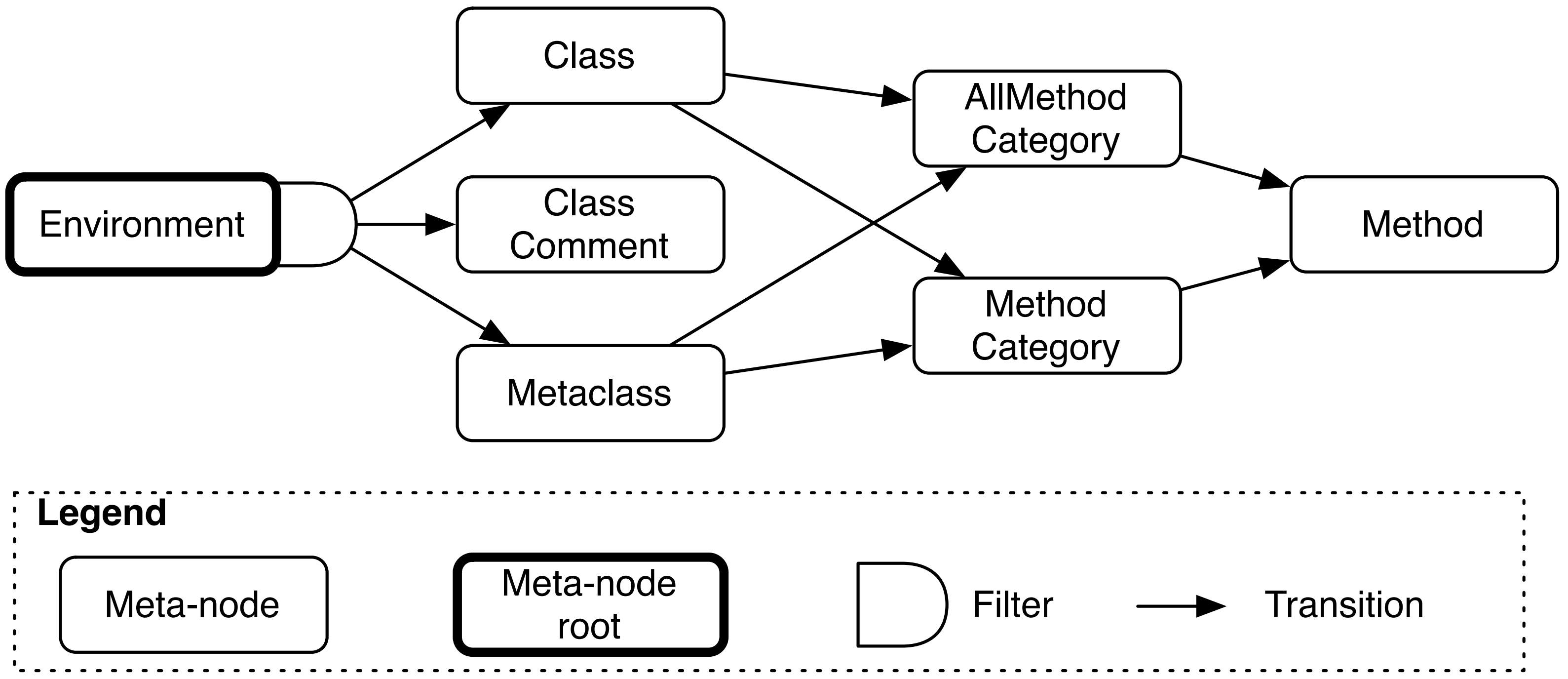
The new system browser...



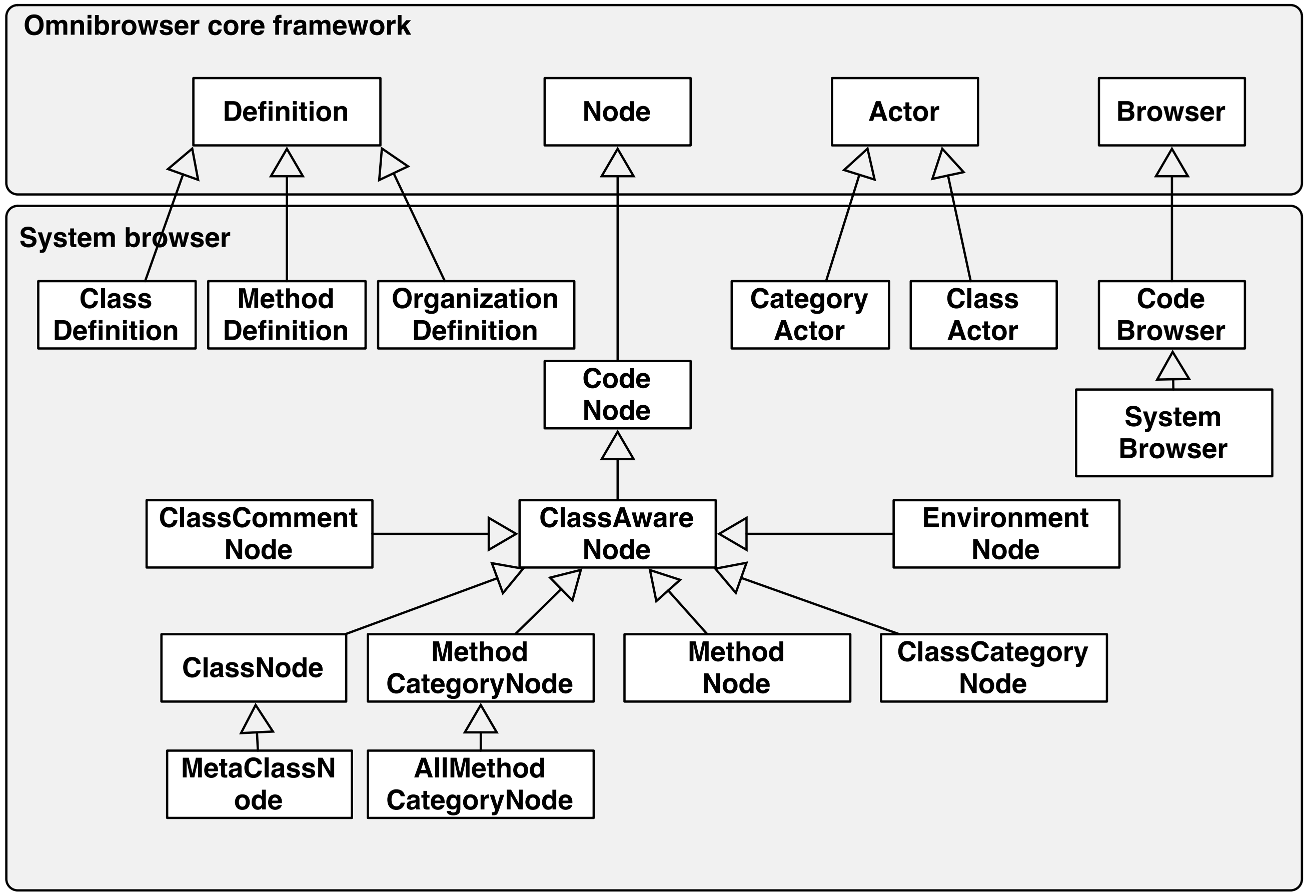
```
templateForSubclassOf: priorClassName category: systemCategoryName
    "Answer an expression that can be edited and evaluated in order to define a new class,
given that the class previously looked at was as given"

    ↑ priorClassName asString, ' subclass: #NameOfSubclass
    instanceVariableNames: ''''
    classVariableNames: ''''
    poolDictionaries: ''''
    category: ''' , systemCategoryName asString , ''''
```

... its Metagraph ...



… and its implementation



Limitations of OmniBrowser ...

- Hardcoded flow
  - Navigation has to follow the left-to-right list construction
  - Would be difficult to implement Whiskers
- Currently selected item
  - Difficulty to implement advanced browsing facilities like in VisualWorks

… and its strenghts

- Ease of use
  - do not need to deal with graphical objects

- Explicit state transition
  - graphical objects are automatically updated.

- Separation of domain and navigation
  - better readability of the code

Conclusion

- Framework to build easily new browser
- Based on notion of nodes, metagraph, actors, definition and filters
- Included per default in Squeak 3.9
- Already existing browsers:
  - changes, implementors, senders, variables, version, ...
  - coverage browser
  - dual browser
  - Traits browser
  - Pier browser