Painting objects with Mondrian

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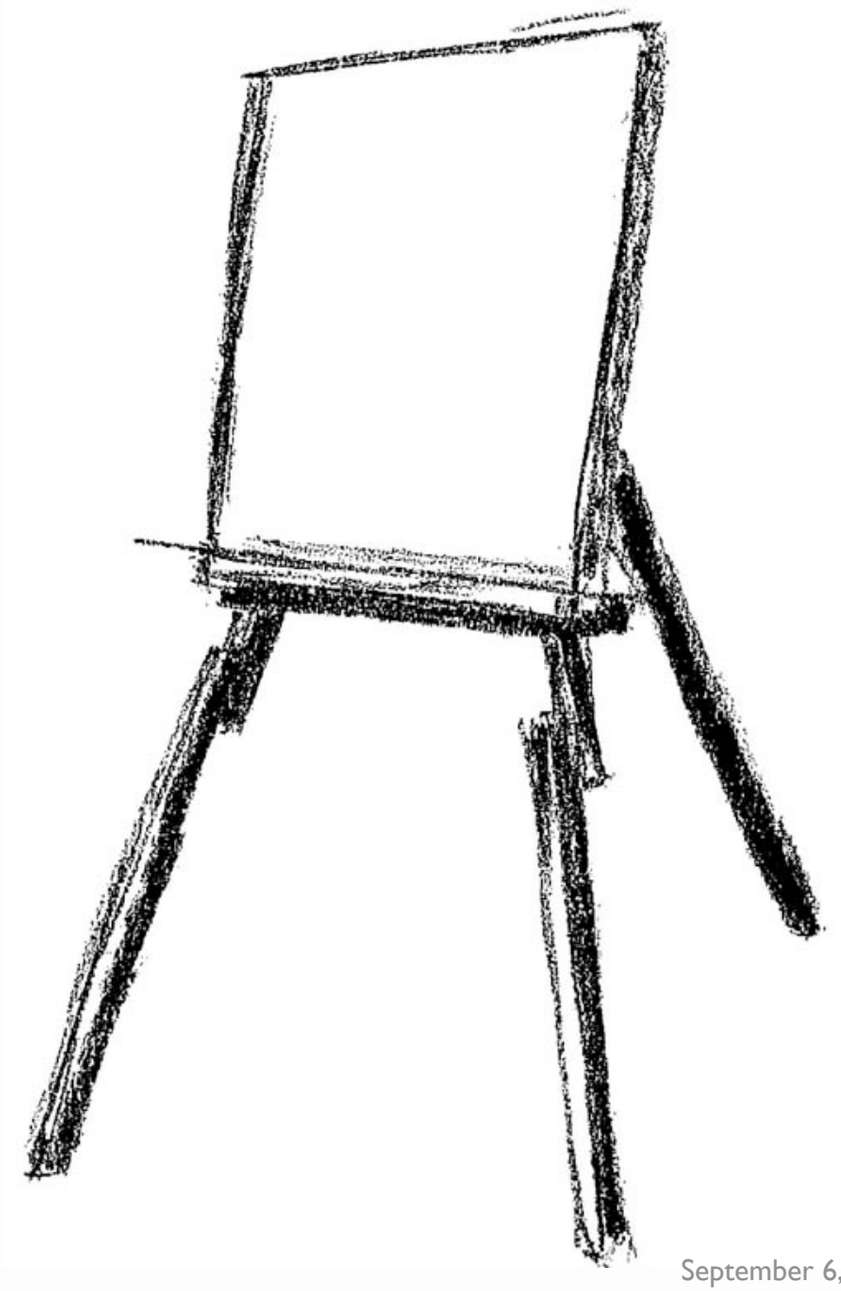


September 6, 2006

Mondrian is about visualization

Mondrian is also about interaction

please ask questions

Why visualization?

“One picture is worth a thousand words”

Glue Schema
Namespace: Glue
vers. 1.0 - 24/08/2002

Info
- LRMSType : string
- LRMSVersion : string
- GRAMVersion : string
- HostName : string
- GatekeeperPort : string
- TotalCPUs : int

State
- Status : string
- TotalJobs : int
- RunningJobs : int
- WaitingJobs : int
- WorstResponseTime : int
- EstimatedResponseTime : int
- FreeCPUs : int

Policy
- MaxWallClockTime : int
- MaxCPUTime : int
- MaxTotalJobs : int
- MaxRunningJobs : int
- Priority : int

Job
- GlobalID : string
- LocalID : string
- LocalOwner : string
- GlobalOwner : string
- Status : string
- SchedulerSpecific : string

0..*

AccessControlBase
- Rule : string [0..*]

ComputingElement
- Name : string
- UniqueID : string [key]

1..*
Hosted Service
1..*

Cluster
- Name : string
- UniqueID : string [key]

1..*

SubCluster
- Name : string
- UniqueID : string [key]

participating host
1..*

Host

SMPLoad
- Load1Min : int
- Load5Min : int
- Load15Min : int

ProcessorLoad
- Load1Min : int
- Load5Min : int
- Load15Min : int

HostedFileSystem
1..*

FileSystem
- Name : string [key]
- Root : string
- Size : int
- AvailableSpace : int
- ReadOnly : boolean
- Type : string

0..*

RemoteFileSystem

LocalFileSystem

0..1
export
0..*

0..1
mount

Directory
- Name : string

0..1

0..*
+Directory contains file

File
- Name : string [key]
- Size : int
- CreationDate : datetime
- LastModified : datetime
- LastAccessed : datetime
- Latency : int
- LifeTime : datetime
- Owner : string

1..*

Benchmark
- SI00 : float
- SF00 : float

MainMemory
- RAMSize : int
- RAMAvailable : int
- VirtualSize : int
- VirtualAvailable : int

StorageDevice
- Name : string
- Type : string
- TransferRate : int
- Size : int
- AvailableSpace : int

Architecture
- PlatformType : string
- SMPSize : int

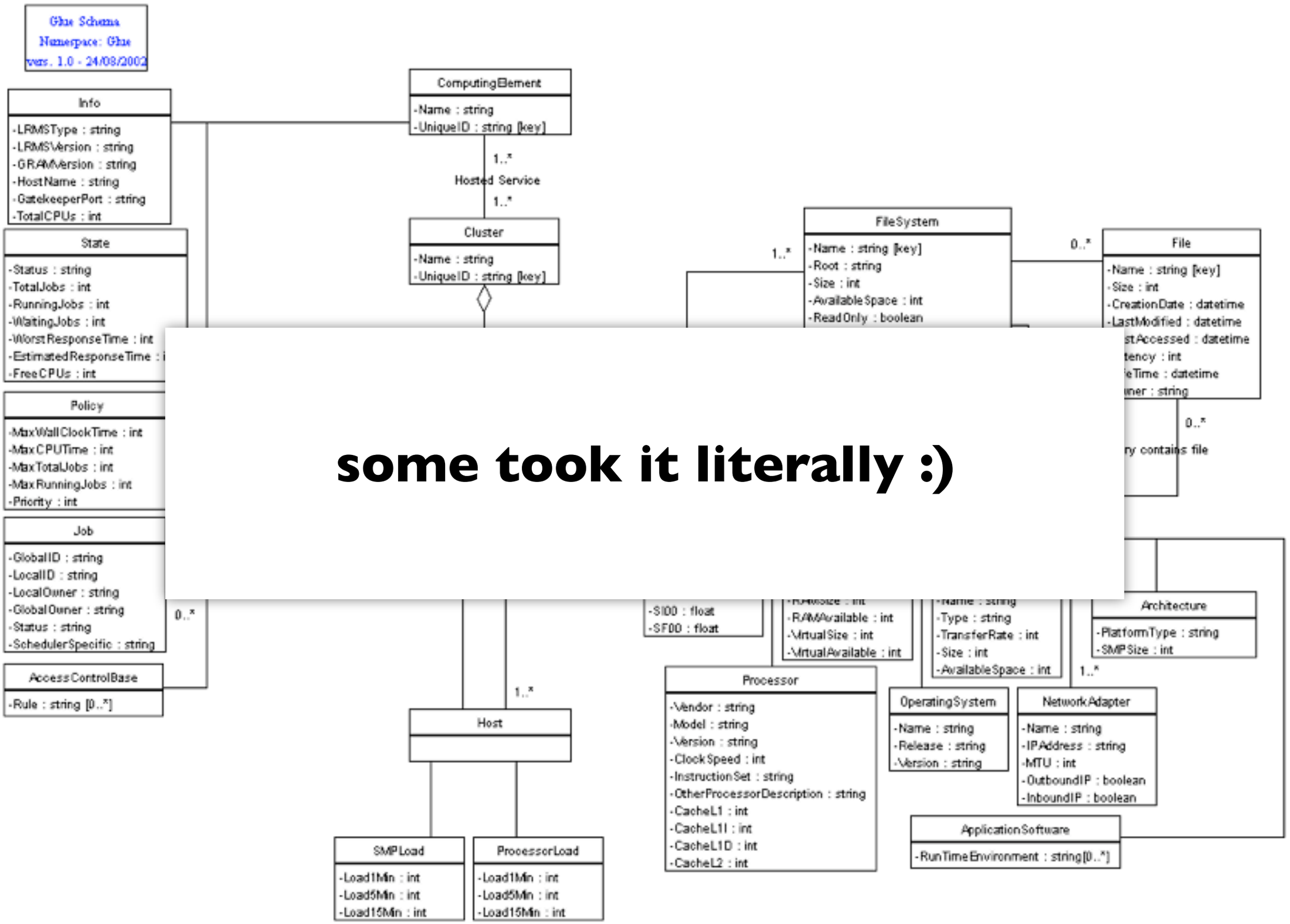
1..*

Processor
- Vendor : string
- Model : string
- Version : string
- ClockSpeed : int
- InstructionSet : string
- OtherProcessorDescription : string
- CacheL1 : int
- CacheL1I : int
- CacheL1D : int
- CacheL2 : int

OperatingSystem
- Name : string
- Release : string
- Version : string

NetworkAdapter
- Name : string
- IPAddress : string
- MTU : int
- OutboundIP : boolean
- InboundIP : boolean

ApplicationSoftware
- RunTimeEnvironment : string[0..*]



some took it literally :)

70% of our sensors are dedicated to vision

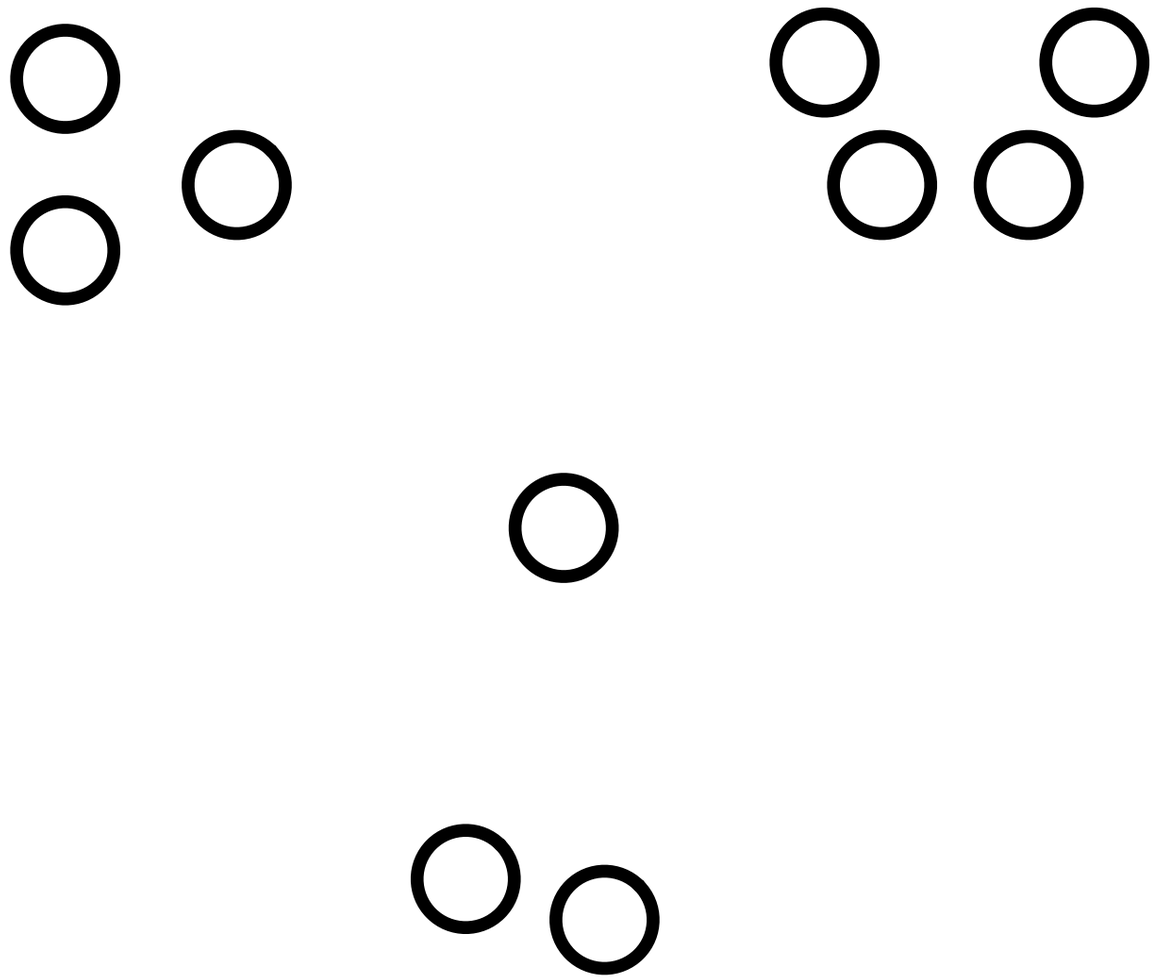
Do you see?

Picture it!

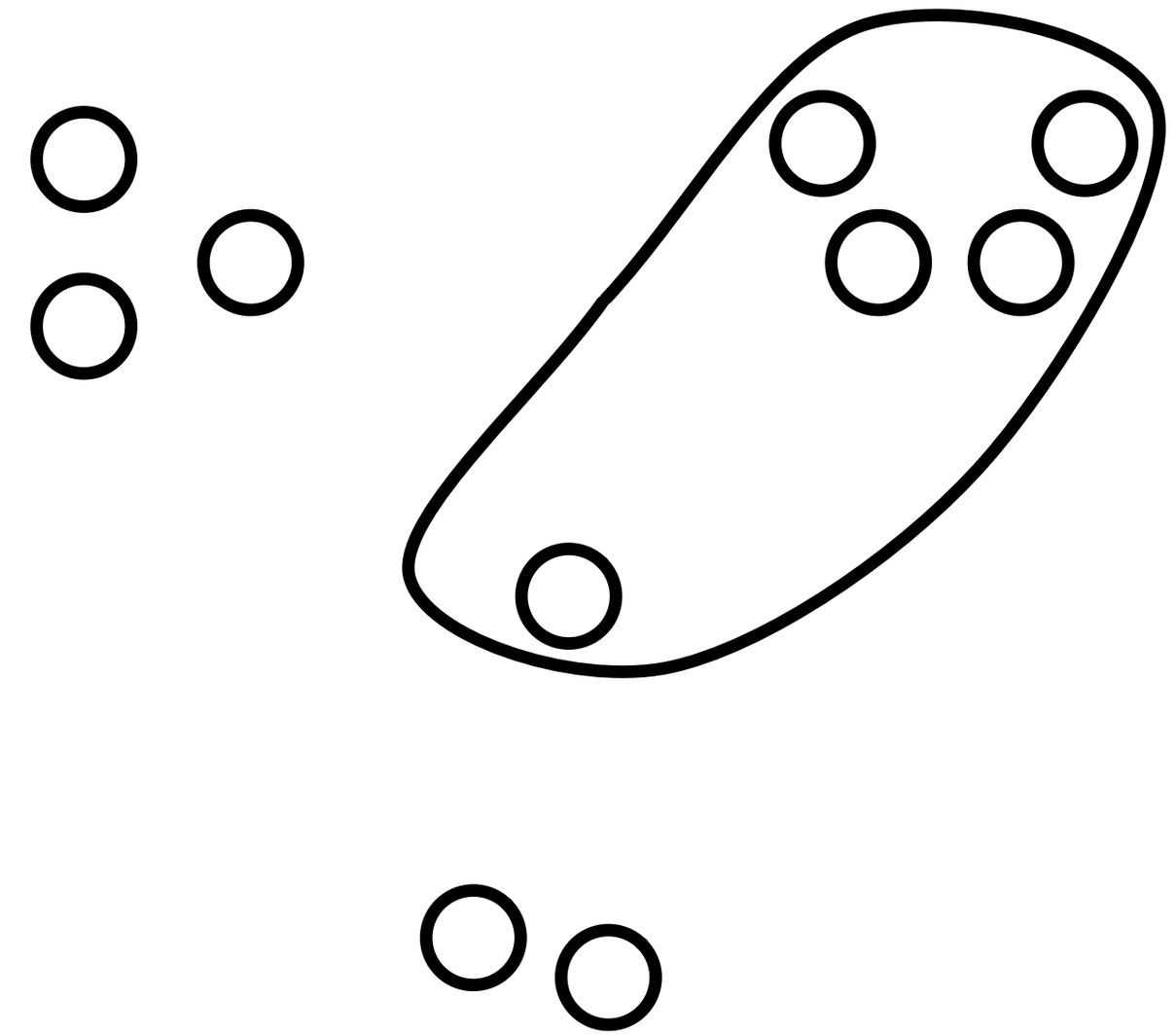
Let's see

I see

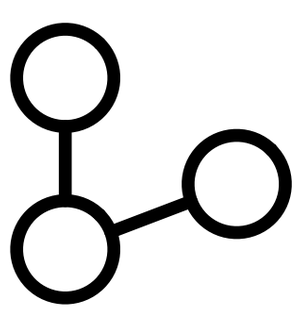
How many groups do you see?

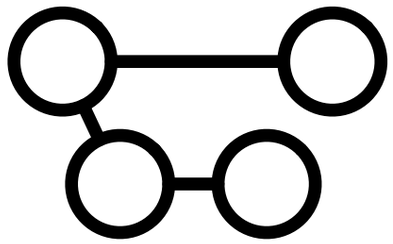


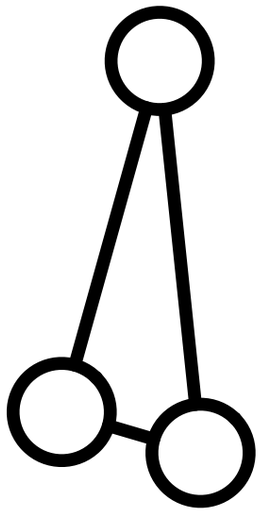
How many groups do you see?



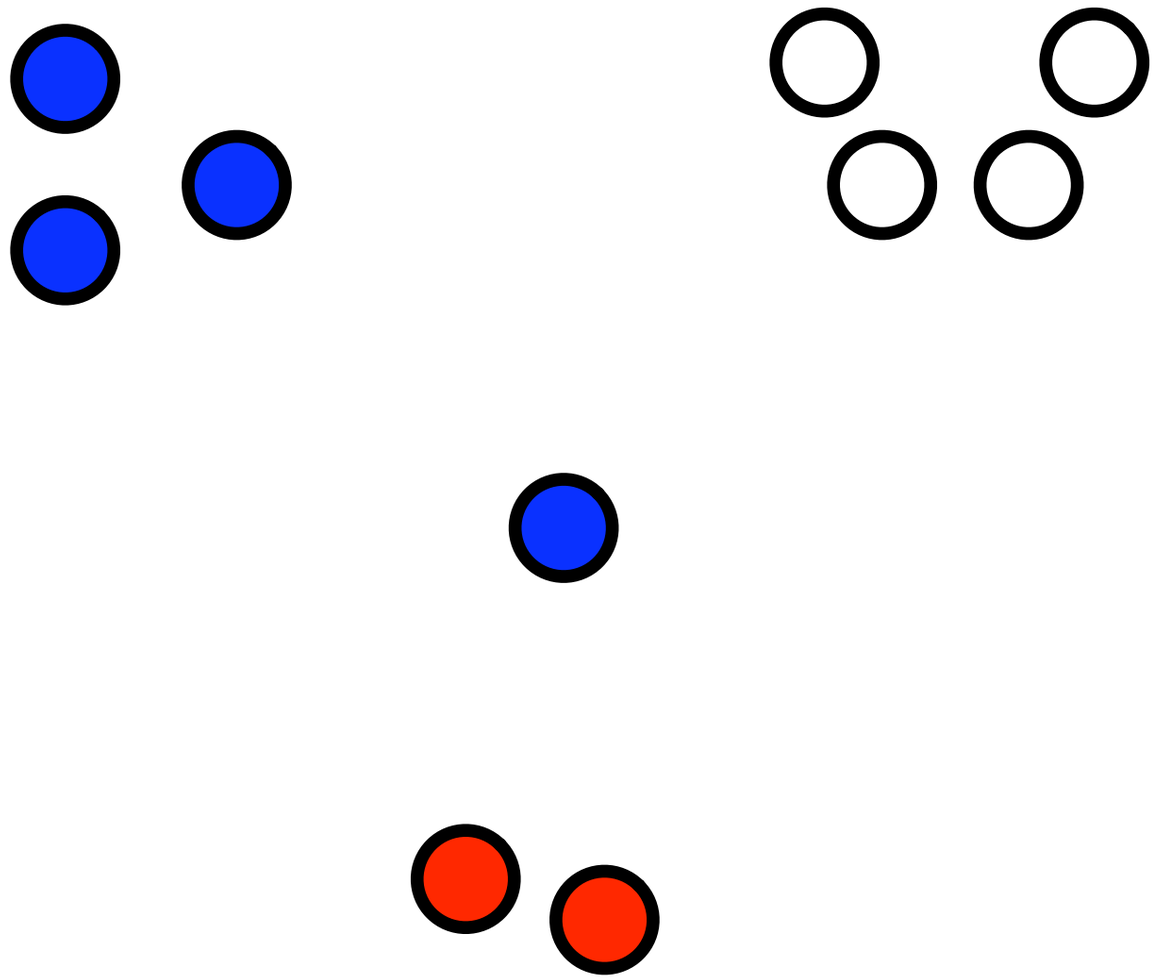
How many groups do you see?







How many groups do you see?



70% of our sensors are dedicated to vision

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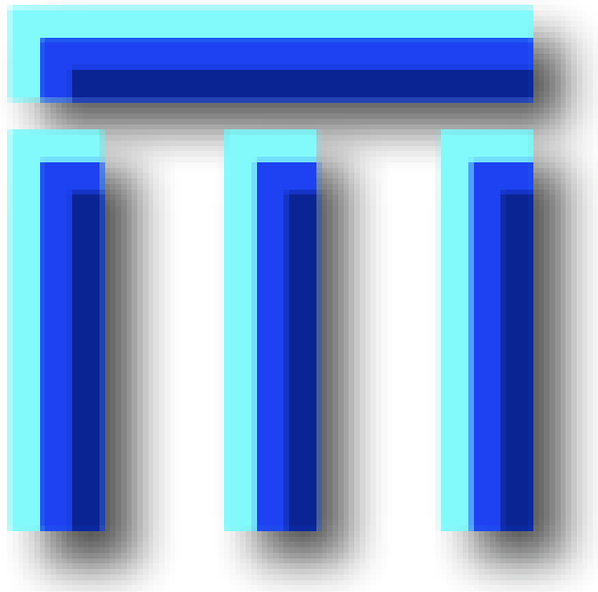
“One picture is worth a thousand words”

Example: What is  **?**

absent absolute abstract accept access accessed accesses accessing accessor action actions add added addressee anchor annotate annotated applied

argument arguments aspect assignment association attribute attributes authors auto average bar base based basic behaviour behavioural belongs big

binding bindings block blueprint body boolean born browse browser build bundle bundles button bytes cache cancel candidate candidates cascade

categories category cdif cf change changed characters chart check child children class classes clear clones close code cohesion collect collection

column comment comments compilation complete complex complexity computable compute computed condition conditionals const constructor content

contents context control correct correlation count counter create current cvs cyclomatic data dataset dead declared deep default defined defining

definition dependencies dependents description descriptions descriptor destination detect deviation dictionary difference direct dirty display distinct distribution

drag duplicated duplication duplications earliest edit editor empty encoding ensure entities entity equals error evolution exists explicit export expression

expressions extended external extract extracted factor famix favorites feedback field file filed files filter fixed folder folders formal fragments full

function fuziness fuzzy global god grid group grouped groups handle hierarchy high higher historical histories history home icon id implementation

implicit import importer importing include included includes including incoming increase index information inheritance inheritances inherited inherits initialize

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menu message meta metaclass metamodel method methods metric model models mof mondrian moose moosify mse multiplications multiplier named

names namespace namespaces navigation needed nesting nil node number object occurrence occurrences omit open operate operation operator optimize

originate originator outgoing output overriden package packaged packages panel parameter parameters paranthesis parcel parcels parent parser part

percent position positional post pragma pre prec present pressed primitive print prior private process progress properties property protected public

pure put qualifier question read receiver receiving recursive recursively reduce reference registry reify reject related remove removed replace request

reset return root satisfy save scan scanner scope section select selected selector selectors send sends separator sequence server service set shape

short signature signatures silent simple size smalltalk sole sort sorting source space spaces spec splice squeak st stability start state statements

store strange strategy stream string structural stub subcanvas subclass subclasses subsection suffix sum super superclass superclasses suplimentary

symbol system table tabs tag targets tcc temporaries text threshold token tool total treating tree type types ui uml understand uninitialize union

unique unknown unnamed update uuid values var variable variables version versions view viewer widget window write xmetamodel xmi

absent absolute abstract **accept** access accessed accesses accessing accessor action actions add added addressee **anchor** annotate annotated applied argument arguments aspect assignment association attribute attributes authors auto average bar base based basic behaviour behavioural belongs big binding bindings block **blueprint** body boolean born browse **browser** build bundle bundles button bytes cache cancel candidate candidates cascade categories category cdif cf change changed characters chart check child children class classes **clear** clones close code cohesion collect collection column comment comments compilation complete complex complexity computable compute computed condition conditionals const constructor **content** contents context control correct correlation count counter create current cvs cyclomatic data dataset dead declared deep default defined defining definition dependencies dependents description descriptions descriptor destination **detect** deviation dictionary difference direct dirty display distinct distribution drag duplicated **duplication** duplications earliest edit editor empty encoding ensure entities entity equals error evolution exists **explicit** export expression **expressions** extended external extract extracted factor famix **favorites** feedback field file filed **files** filter fixed folder folders formal fragments full function fuziness fuzzy global god grid group grouped groups handle hierarchy high higher historical histories history home icon id implementation implicit import importer importing include included includes including incoming increase index information inheritance inheritances inherited inherits initialize inject inspector inst install instance int interesting interface **internal** internally intersect invocation invocations invoke invoked invokes items java jsp kill kinds label lan language late latest left length **level** lines list literal local log lonely **long** make map mask matches matrix max maximum measure menu **message** meta metaclass metamodel method methods metric model models mof mondrian moose moosify mse multiplications multiplier named names namespace namespaces navigation needed nesting nil node number object occurrence **occurrences** omit open operate operation operator optimize originate originator outgoing output overriden package packaged packages panel parameter parameters **paranthesis** parcel parcels **parent** parser part percent **position** positional post pragma pre prec present pressed primitive print prior private process progress **properties** property protected public pure put qualifier question read receiver receiving **recursive** recursively reduce reference registry **reify** reject related remove removed replace request reset return root satisfy save scan scanner scope section select selected selector selectors send sends separator sequence server service set shape short signature signatures silent simple size smalltalk sole sort sorting source space spaces spec splice squeak st stability start state statements store strange strategy stream string structural stub subcanvas subclass subclasses subsection suffix sum super superclass superclasses suplimentary symbol system table tabs tag targets tcc temporaries text threshold token tool total treating tree type types **ui** uml understand uninitialize union unique unknown unnamed update uuid values var variable variables version versions view viewer widget window write xmetamodel xmi

absent absolute abstract accept access accessed accesses accessing accessor action actions add added addressee anchor annotate annotated applied argument
arguments aspect assignment association attribute attributes authors auto average bar base based basic behaviour behavioural belongs big binding bindings block blueprint
body boolean born browse browser build bundle bundles button bytes cache cancel candidate candidates cascade categories category cdif cf change changed characters
chart check child children class classes clear clones close code cohesion collect collection column comment comments compilation complete complex
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cyclomatic data dataset dead declared deep default defined defining definition dependencies dependents description descriptions descriptor destination detect deviation dictionary
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formal fragments full function fuziness fuzzy global god grid group grouped groups handle hierarchy high higher historical histories history home icon id implementation
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navigation needed nesting nil node number object occurrence occurrences omit open operate operation operator optimize originate originator outgoing output
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pressed primitive print prior private process progress properties property protected public pure put qualifier question read receiver receiving recursive recursively
reduce reference registry reify reject related remove removed replace request reset return root satisfy save scan scanner scope section select selected selector
selectors send sends separator sequence server service set shape short signature signatures silent simple size smalltalk sole sort sorting source space spaces spec
splice squeak st stability start state statements store strange strategy stream string structural stub subcanvas subclass subclasses subsection suffix sum super superclass superclasses
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unnamed update uuid values var variable variables version versions view viewer widget window write xmetamodel xmi

class named number import model reference version classes

method moose metamodel entity group add unique property initialize variable

compute expression set optimize view select history access list belongs methods importing

meta icon string interface default scope namespace menu source file famix attribute type stub package

description save comment ensure pre open declared defined create print accessed build inheritance attributes evolution

code local index block category accesses signatures threshold node extended boolean lines invocations spec signature

window basic complexity candidate empty global smalltalk display histories column remove parameter qualifier folder

control formal invocation label abstract simple collection system receiver hierarchy protected var entities importer born

superclass receiving reduce selector selected packaged private data mask mse argument changed text dependents implicit body

names pragma arguments action packages log filed post average statements incoming present versions encoding invoked context

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uuid dead size assignment root computed pressed editor cyclomatic symbol cvs bundles reject includes st cache left bindings conditionals short

service treating sort earliest change error browse latest annotated put pure items behaviour install inheritances recursively sends space kill handle

direct distribution omit models tag maximum matrix length replace tool send nesting dependencies including values descriptor object close token metric

actions included intersect authors cascade squeak primitive include subcanvas jsp addressee server namespaces absolute satisfy start unknown splice

button total higher originator reset condition mondrian stability invoke descriptions operator child fuzzy strange grouped question cdif fragments

cohesion historical section characters defining late compilation equals interesting uninitialize temporaries uml sole big superclasses needed multiplier association

dirty difference subclasses computable inspector aspect suplimentary map related clones prec occurrence structural grid store overriden kinds xmi union

implementation high table distinct sequence part update cf complex unnamed behavioural positional fixed parser factor cancel internally widget percent

bytes parcel extracted correlation filter understand process scan destination information sum panel stream increase correct selectors types scanner

int categories exists moosify deviation request tcc bar auto const registry targets parcels shape home lan dataset deep strategy matches lonely

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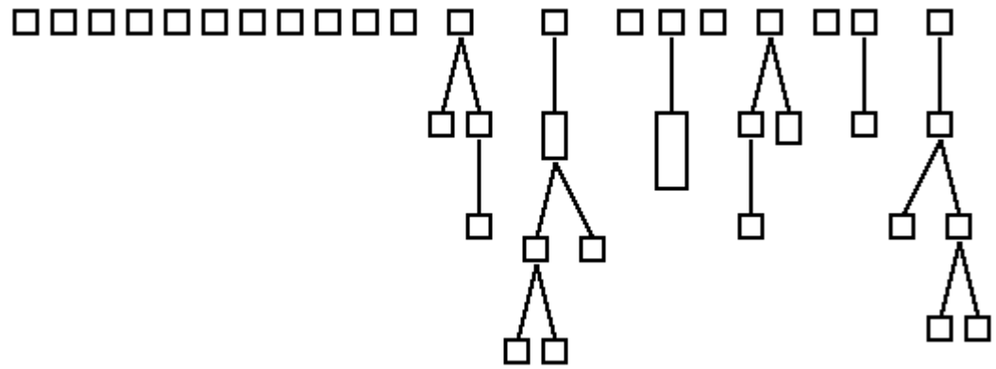
What we have: Graphviz is a visualization engine

```
digraph classGraph {
    A [ shape=polygon, width = 6 ... ]
    B [ shape=polygon, width = 5 ... ]
    ...
    A -> B
    C -> D
    ...
}
```



What we would like

Scripting

Instance based

Any data model

Close to data

Interaction

What we would like

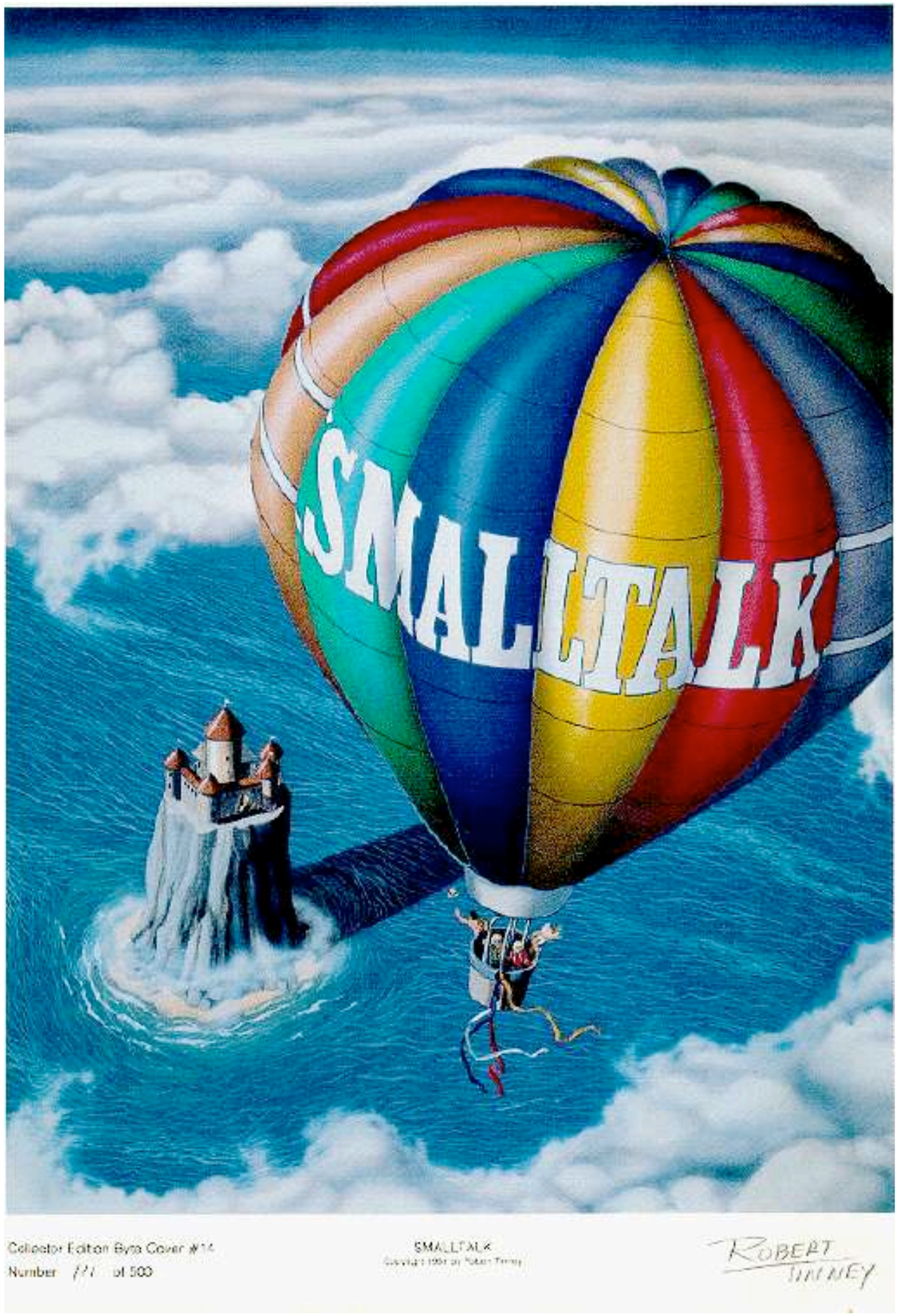
Scripting

Instance based

Any data model

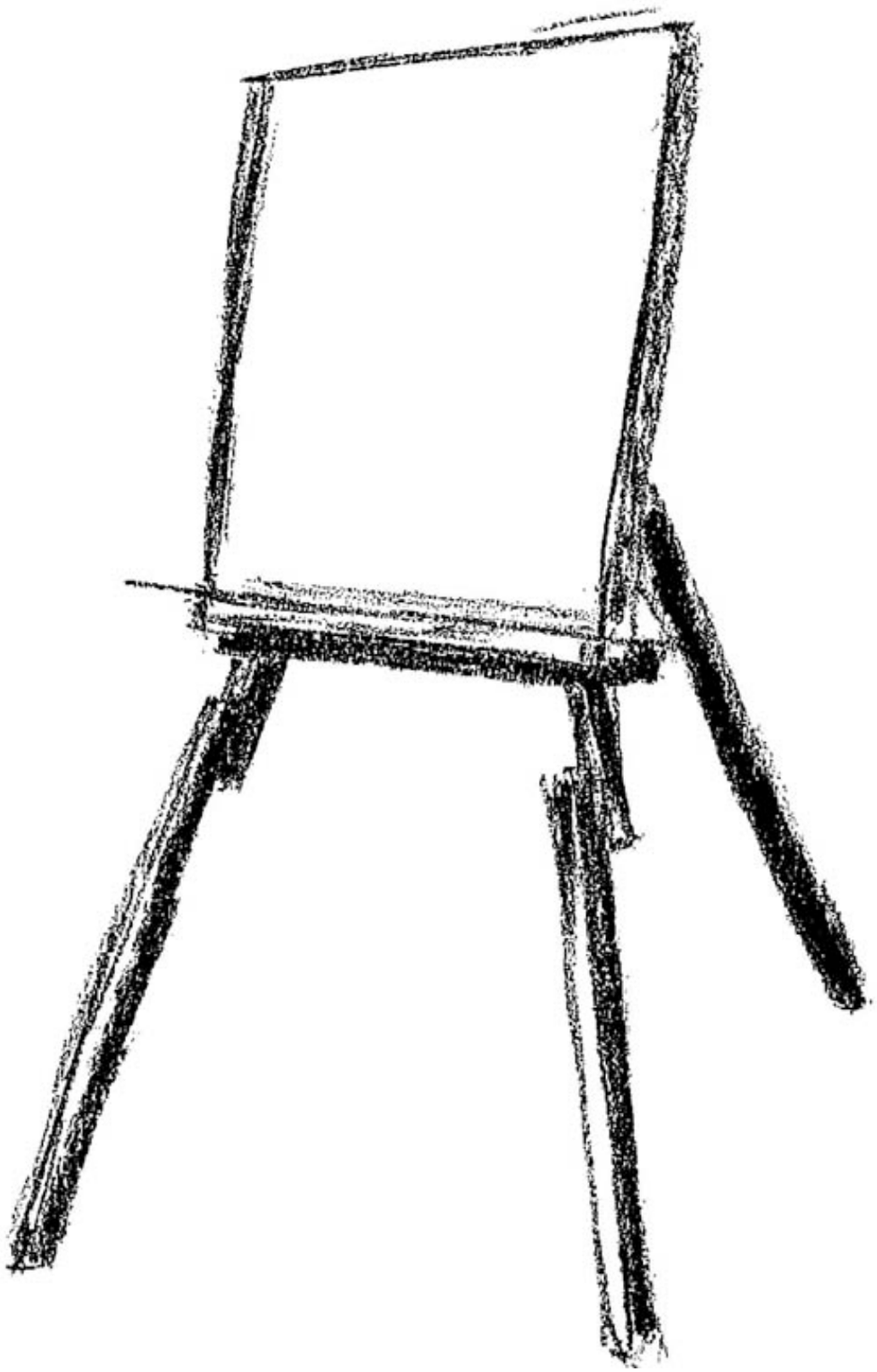
Close to data

Interaction

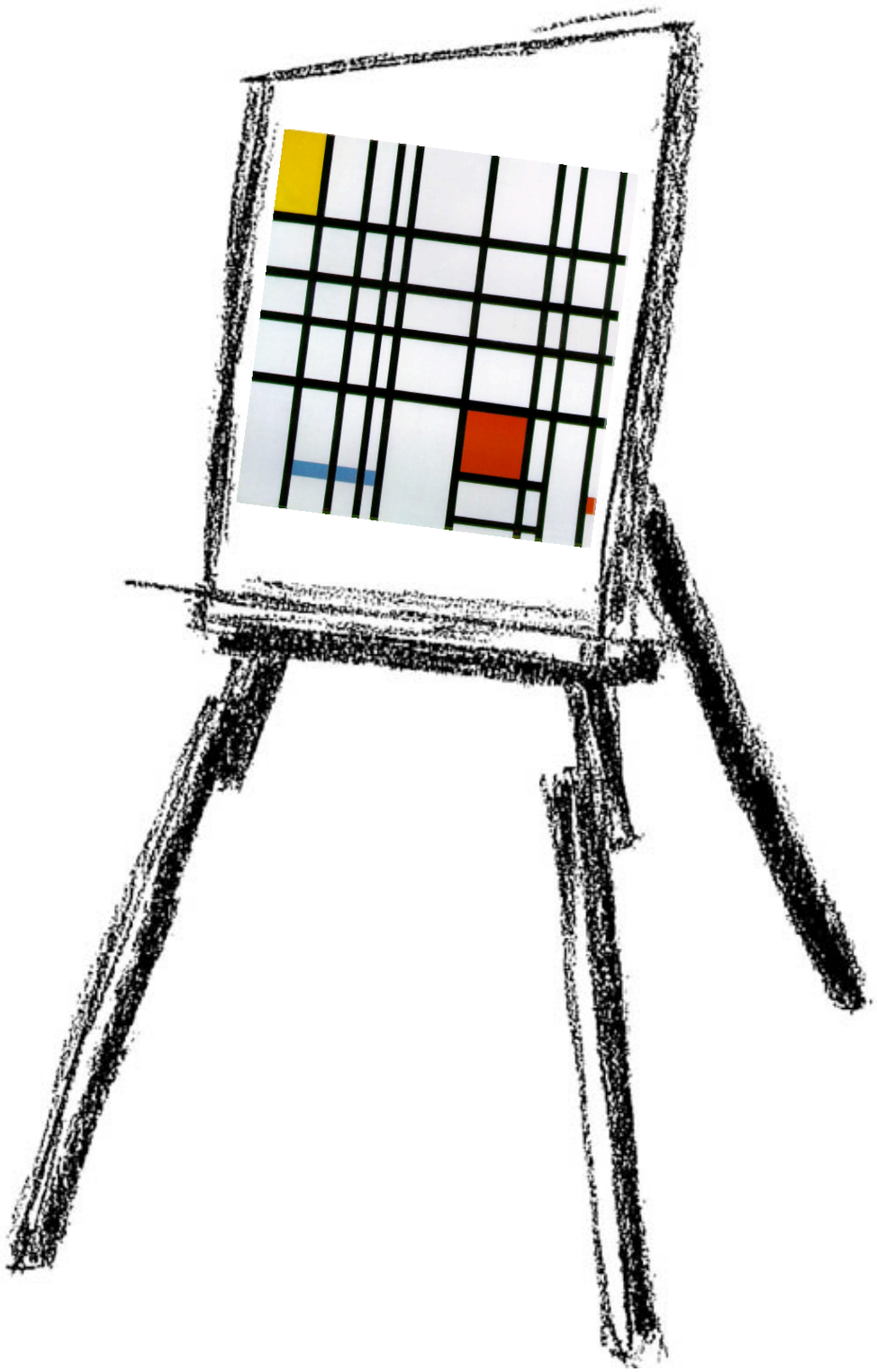


Mondrian

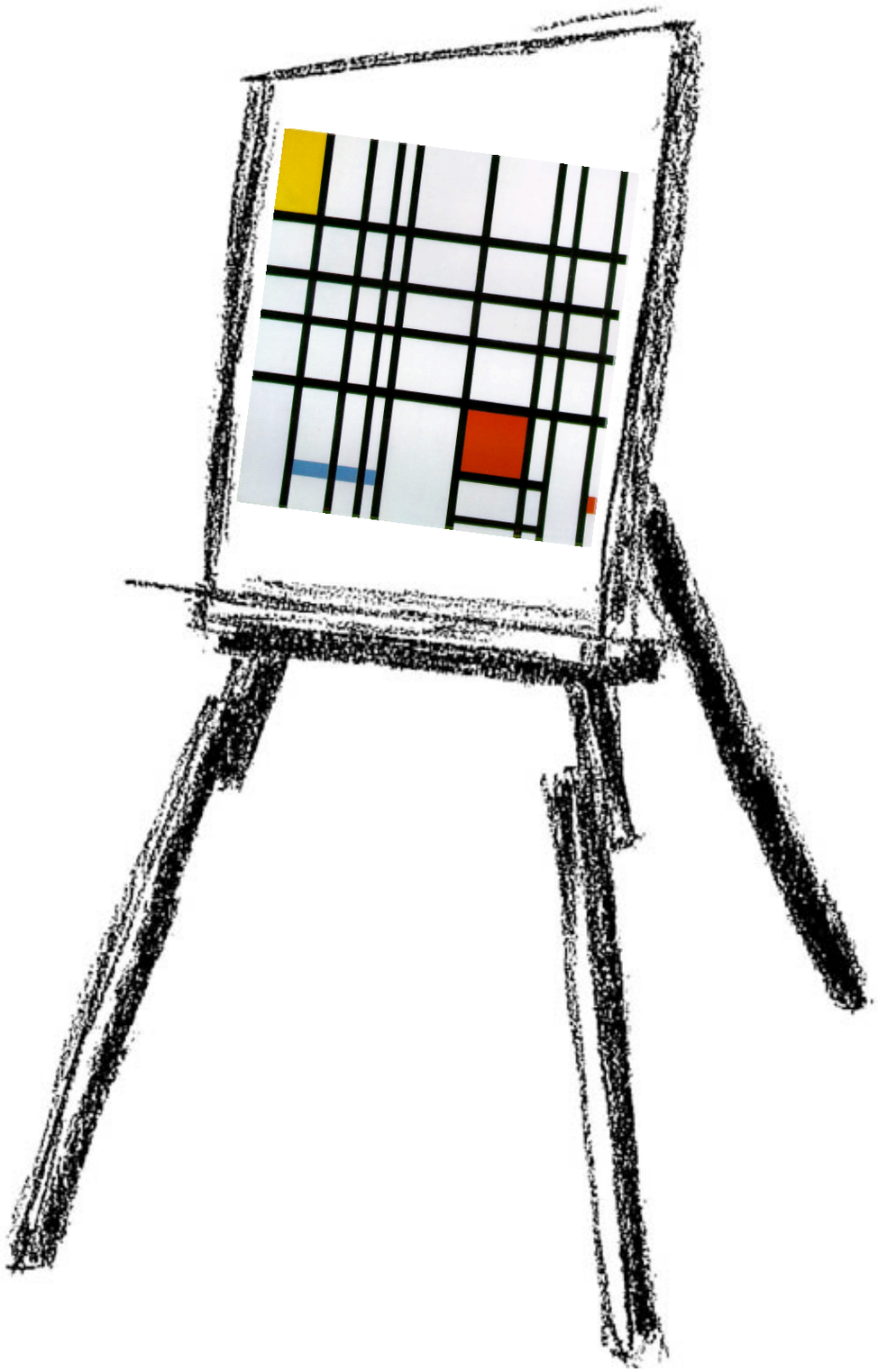
Mondrian metaphor: painting a view

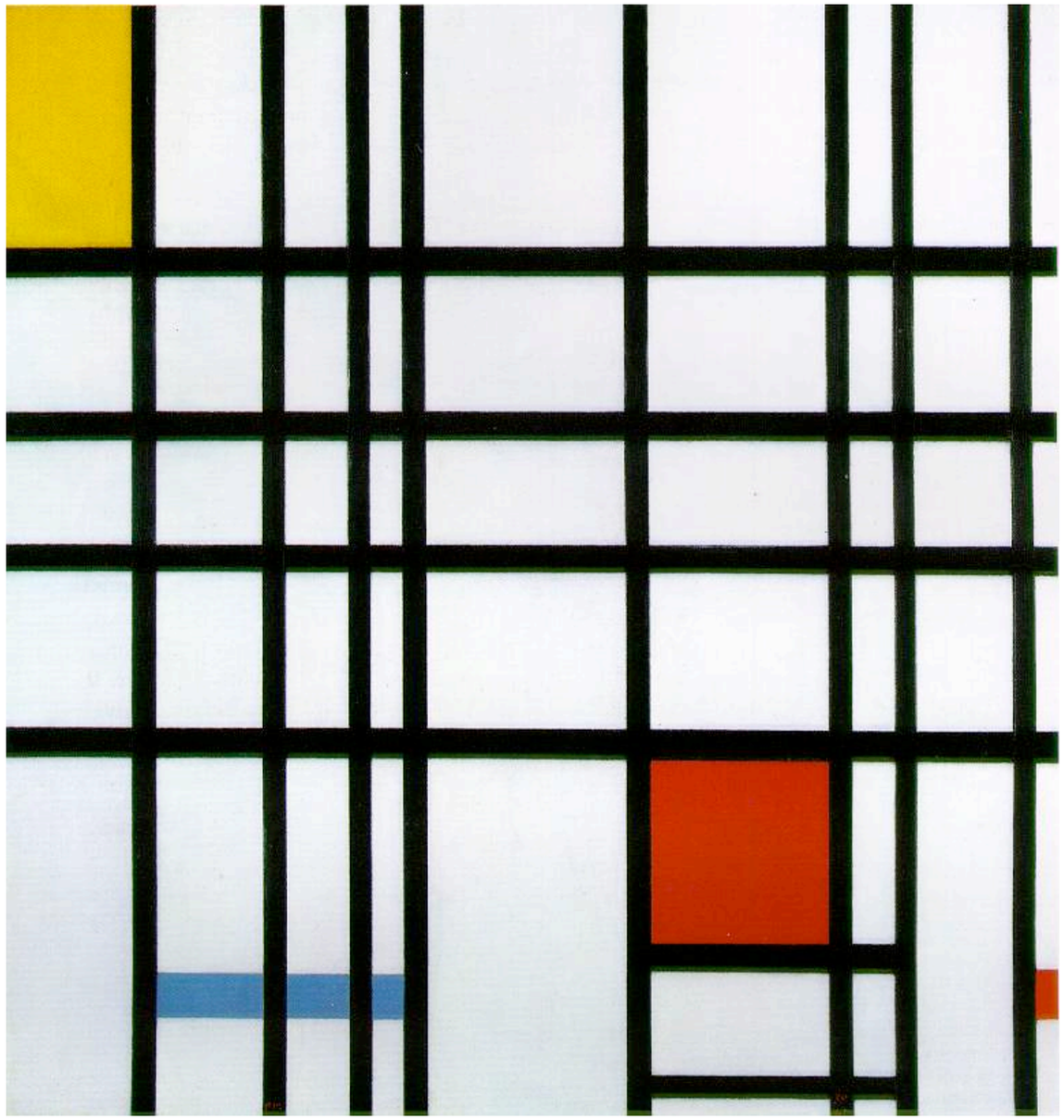


Mondrian metaphor: painting a view



Mondrian metaphor: painting a view





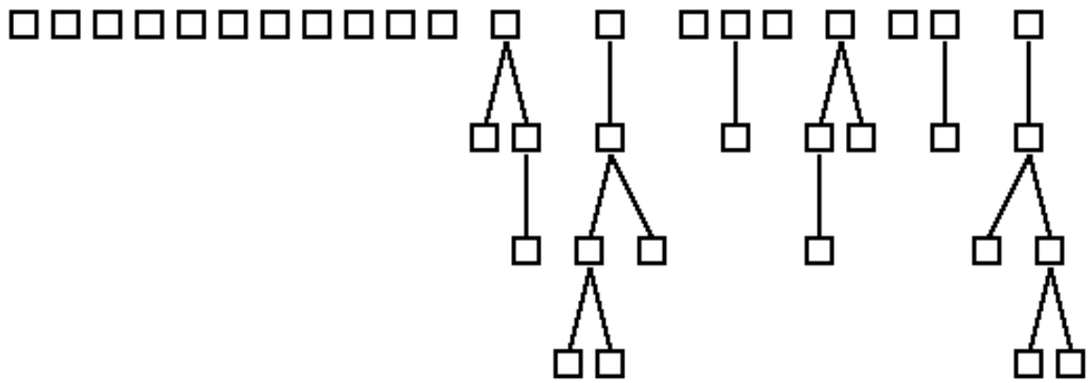
Composition with Red, Yellow and Blue
Piet Mondrian (1921)

The simplest Mondrian script is an empty view

```
view := ViewRenderer new.
view open.
```

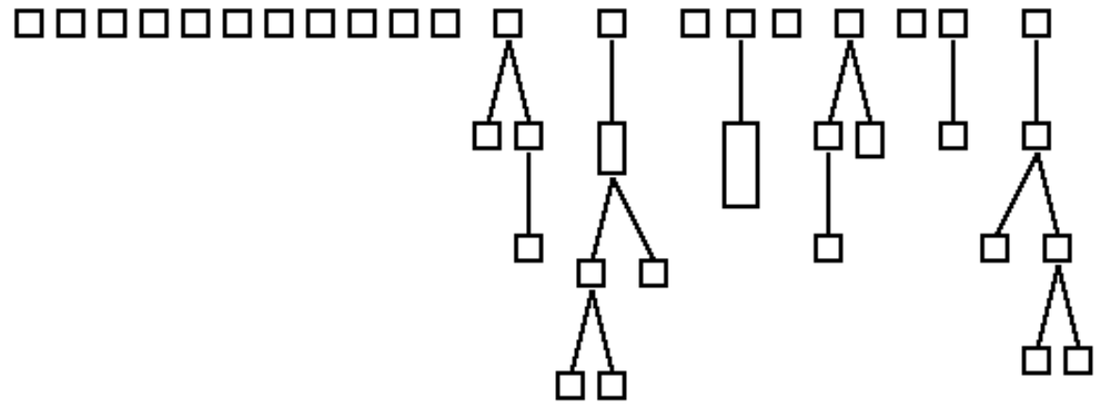
The view consists of nodes and edges arranged according to a layout

```
view := ViewRenderer new.
view nodes: classes.
view edges: classes from: [:each | each superclass] to: [:each | each].
view treeLayout.
view open.
```



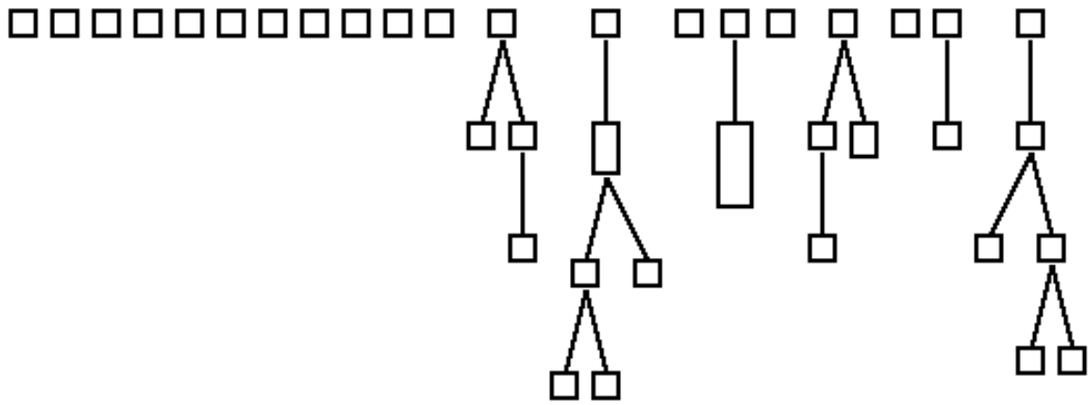
Visual representation is given by the shape

```
view := ViewRenderer new.
view borderedRectangleShape height: [:each | each numberOfMethods].
view nodes: classes.
view edges: classes from: [:each | each superclass] to: [:each | each].
view treeLayout.
view open.
```



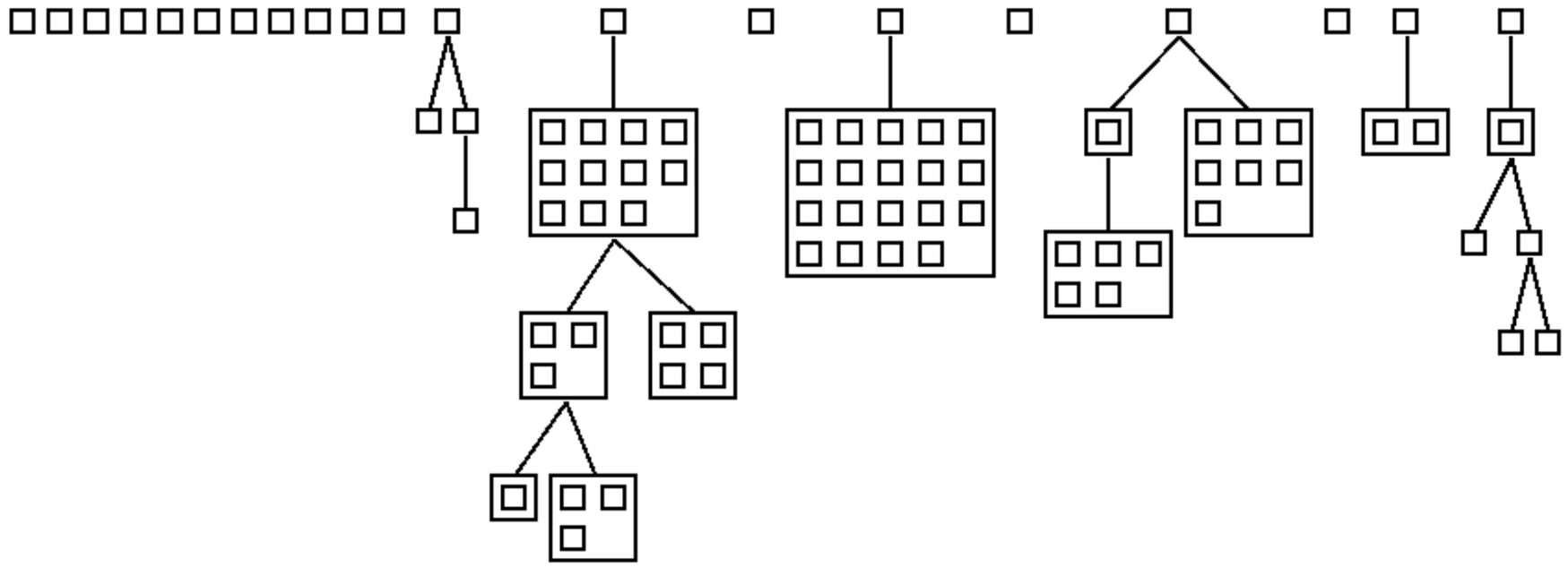
Blocks can be replaced by symbols

```
view := ViewRenderer new.
view borderedRectangleShape height: #numberOfMethods.
view nodes: classes.
view edgesFrom: #superclass.
view treeLayout.
view open.
```



Nesting is done through blocks

```
view := ViewRenderer new.
view borderedRectangleShape.
view nodes: classes forEach: [:each |
    view nodes: each methods.
    view gridLayout].
view edgesFrom: #superclass.
view treeLayout.
view open.
```



What about interaction?

Interaction is scriptable, too

```
view := ViewRenderer new.
view2 := ViewRenderer new.

view interaction onSelect: [:each | each viewOn: view2].
view interaction popupView: [:each :aView | each viewOn: aView].

view nodes: ...
...

view open.
view2 open.
```

Mondrian

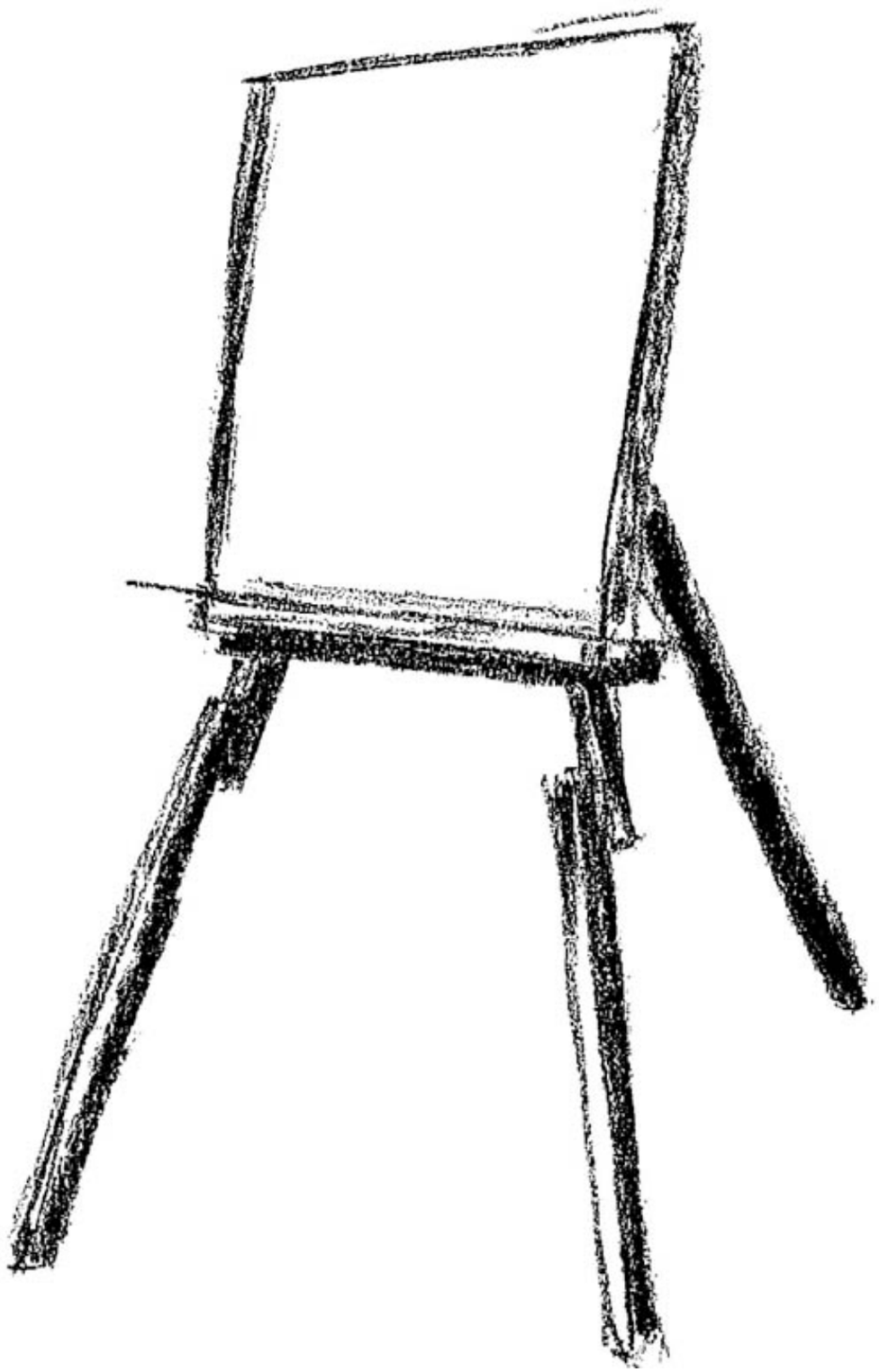
Close to data

Any data model

Scripting

Interaction

Least object creation

Instance based

Soon in the Cincom Store ...