Understanding Git with Alloy

Milestone 2

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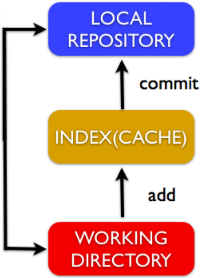
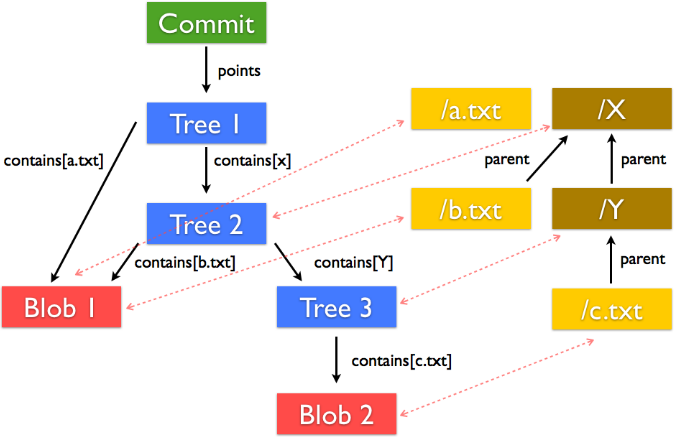
Where were we?

- Focusing on Index + Object Model
- No problem with add and rm operations
- Commit - Big Problem



The problem


Commit
points
Tree 1
contains[a.txt]
contains[x]
Tree 2
contains[b.txt]
contains[Y]
Blob 1
Tree 3
contains[c.txt]
Blob 2
/a.txt
/X
parent
parent
/b.txt
/Y
parent
/c.txt

How did we solve it?

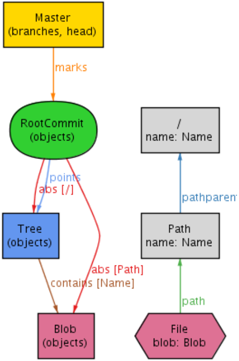
Abstraction

- In each commit there is relation between Objects and Paths
- Facts to reflect the parent relationship

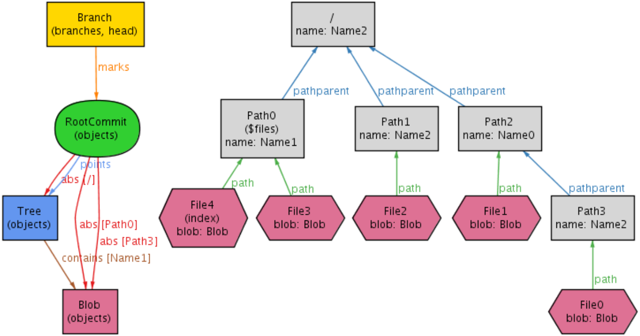
```
sig Commit extends Object {
    points : Tree,
    parent : set Commit,
    abs: Path -> Object
}
```

```
all c: Commit{
    let objs = c.points.*(contents.Name){
        c.abs in Path some -> lone objs
        (c.abs).(c.points) in Root
        all p,q : (c.abs).univ | p -> q in pathparent
            implies q.(c.abs) -> p.(c.abs) -> p.name in contents
        all t,o : objs, n : Name | t -> o -> n in contents
            implies all y : c.abs.t | some x : c.abs.o |
                x -> y in pathparent and x.name = n
    }
}
```

The abstraction relation



The abstraction relation



Model

```
abstract sig Object {
   objects: set State
}

sig Blob extends Object {}

sig Tree extends Object {
   contains : Name -> lone (Tree+Blob)
}

sig Commit extends Object {
   points : Tree,
   parent : set Commit,
   abs: Path -> Object
}

sig RootCommit extends Commit {}

sig Branch{
   marks: Commit one -> State,
   branches: set State,
   head: set State
}

lone sig Master extends Branch{}
```

```
sig Path {
   pathparent : lone Path,
   name : Name
}

sig File{
   path: Path,
   blob: Blob,
   index: set State
}
```

Operations

Properties

Future work

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