software studio

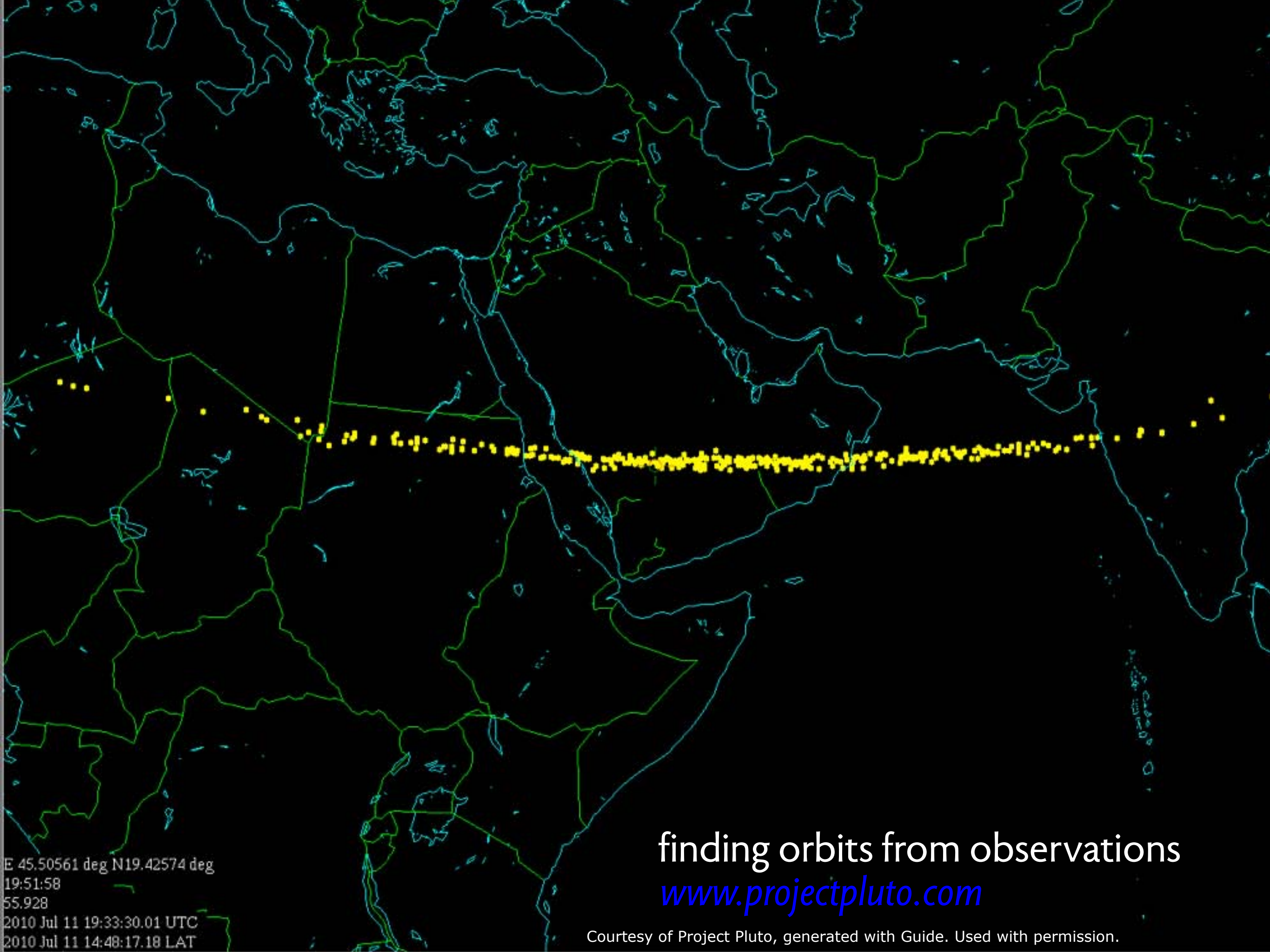## object model dynamics

Daniel Jackson

statics & dynamics

the object model is static
- › just describes snapshots
- › like an orbit of a planet

what about the dynamics?
- › what changes (mutability)
- › how things change (operations)

finding orbits from observations
www.projectpluto.com

Courtesy of Project Pluto, generated with Guide. Used with permission.

E 45.50561 deg N19.42574 deg
19:51:58
55.928
2010 Jul 11 19:33:30.01 UTC
2010 Jul 11 14:48:17.18 LAT

mutability

in practice
> all sets and relations grow and shrink
> things come and go, born and die
> systems acquire and lose knowledge

but some things don't change
> image of an element under a relation
> classification of an element into sets

example: social security numbers
> new SSNs created every year
> can a person change her SSN?
> can an SSN be reassigned to a different person?

another example: course numbers at MIT
> very practical issue for Area 2 system!
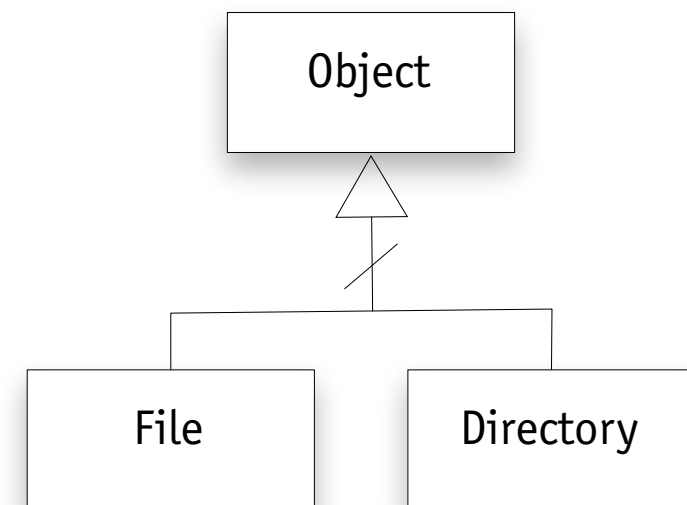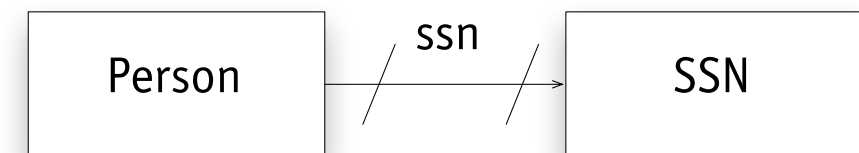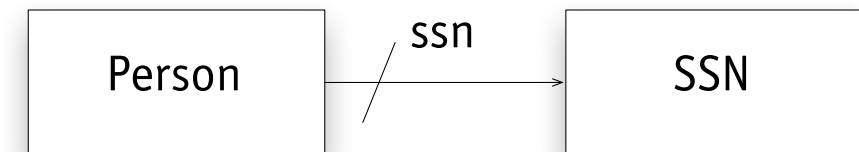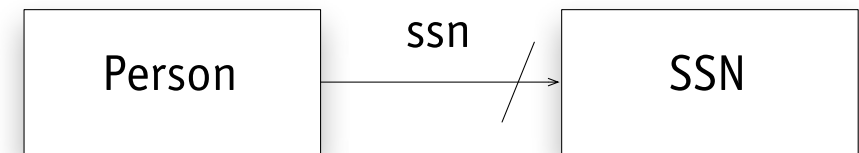
a notation for mutability

relation mutability
› hash marks immutable end

example: social security number
› person can't change their SSN
› SSN can't be reassigned
› both properties

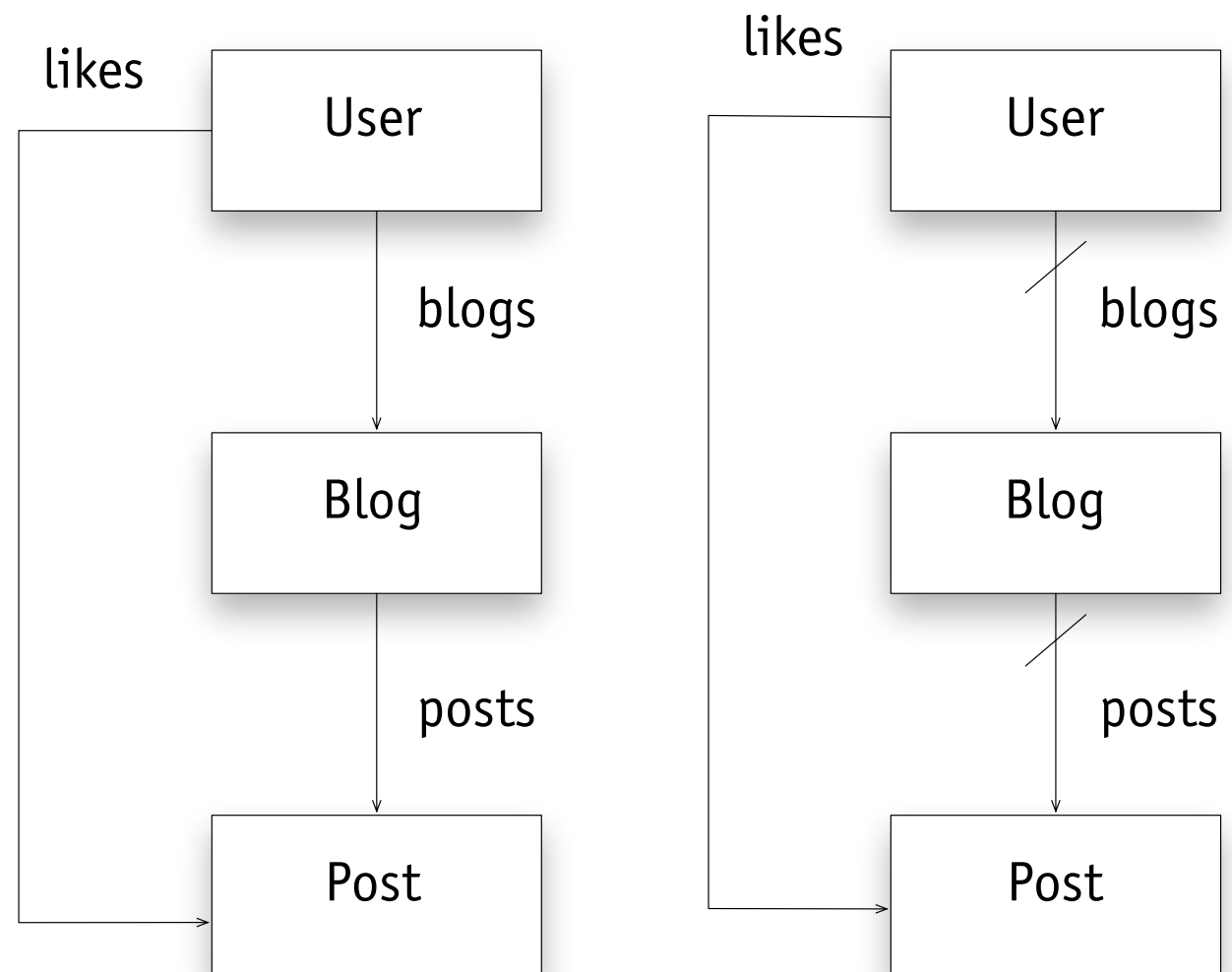**classification mutability**
› hash says classification is static

your turn: a blog site

features

› you can have multiple blogs

› users can like each others posts

exercise

› draw an object model

› add mutability marks
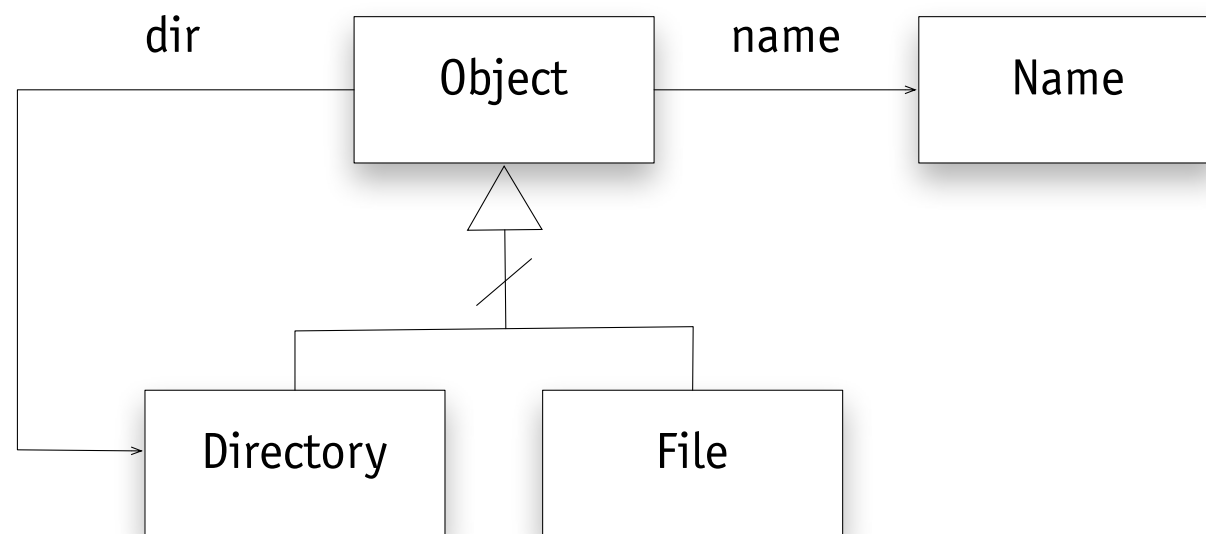
elements of operation specs

frame condition
› "modifies x": only x might change

precondition
› "requires p": predicate p holds before

postcondition
› "effects p": p relates state before & after

dir ── Object ── name ──> Name

Object △ Directory, File

Directory   File

operation mv (o, d)
modifies dir
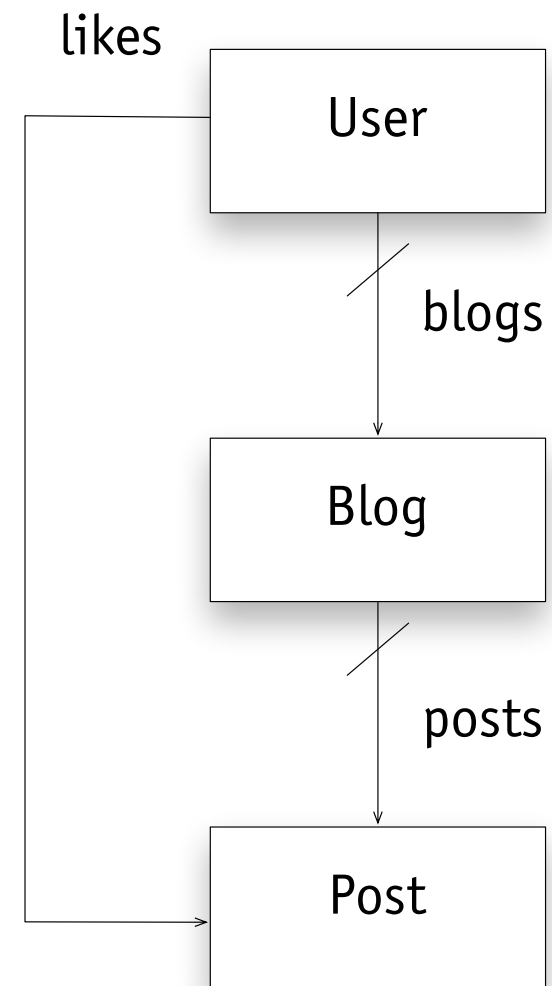**requires** o in Object and d in Dir
effects dir' = dir ++ o -> d

your turn: blog operations

questions
› what are the operations?
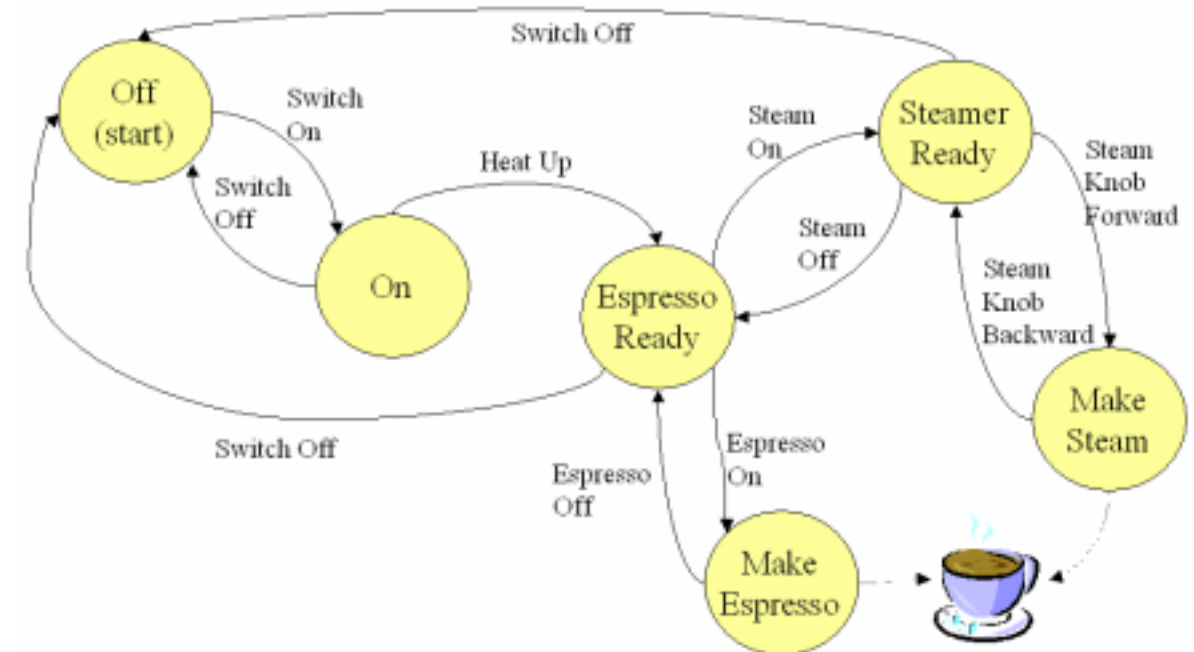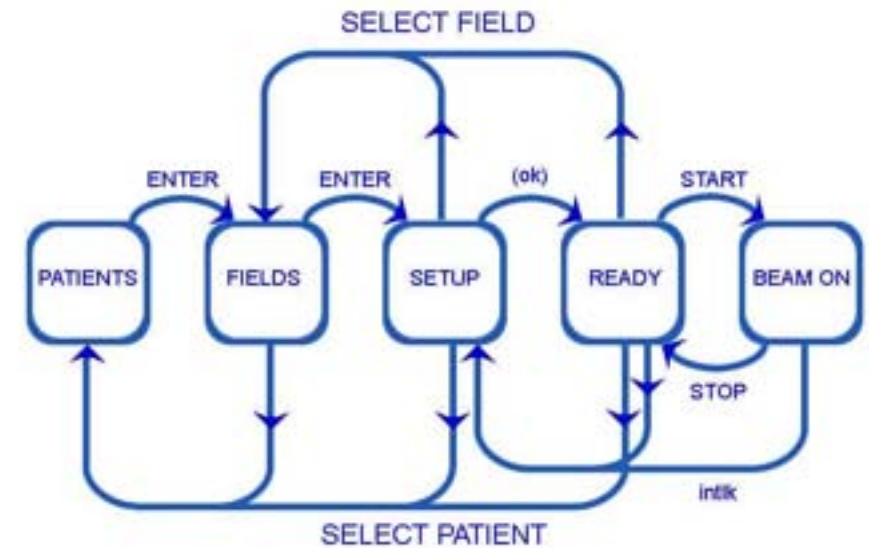› which aren't simple CRUD?
› what are their specs?

notes
› cascading deletes
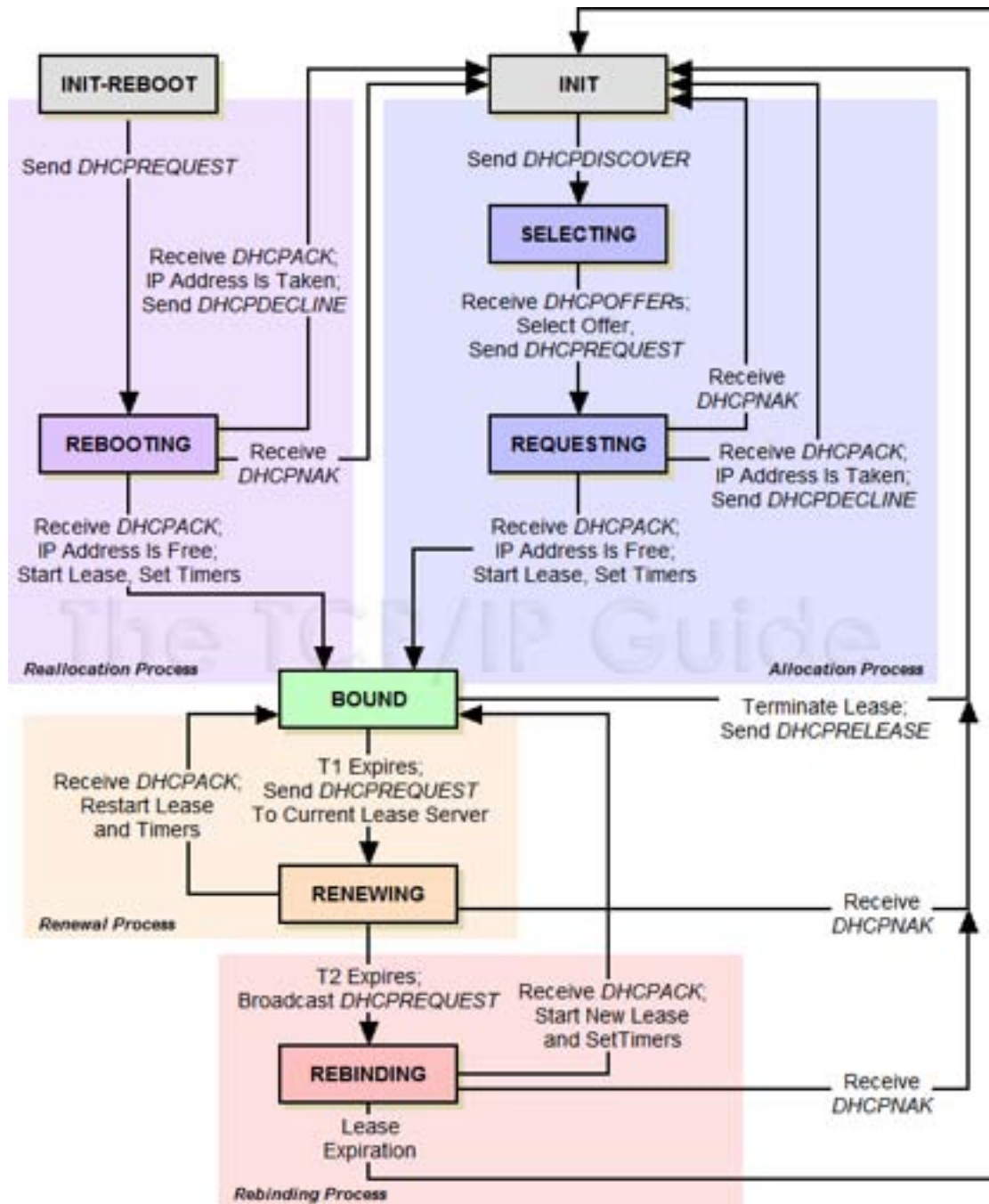› frame condition for deletePost?

likes

User

blogs

Blog

posts

Post

the big picture

object model + operations = labeled state transition system

6.170 Software Studio

Spring 2013