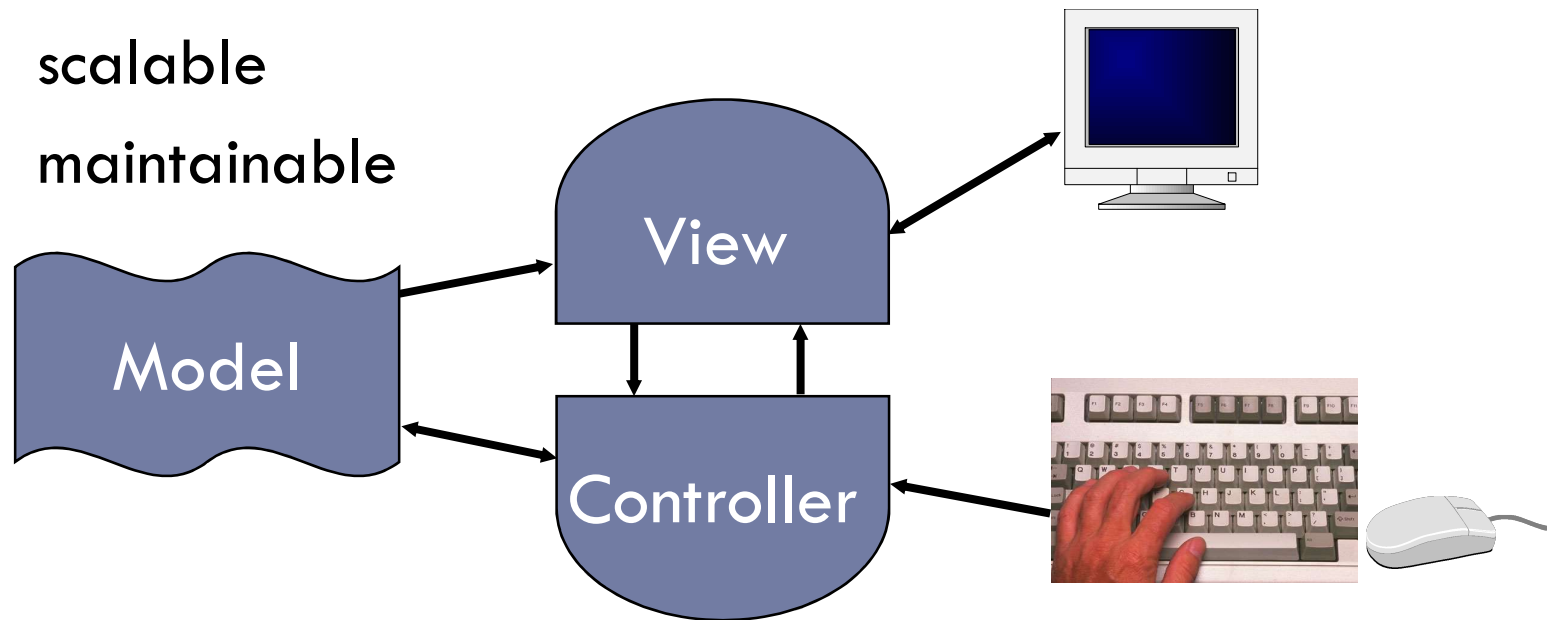


CONTROLLER STATE MACHINES

CMPT 381

Model-View-Controller

- An architecture for interactive applications
 - introduced by Smalltalk developers at PARC
- Partitions application so that it is:
 - scalable
 - maintainable



Overview

Touch interaction is overloaded

State machines

Implementation: switch statement

Implementation: State pattern

Interaction: verbs vs. nouns

Command languages: verbs

```
gutwin@cadanera /usr/bin
$ ls *.exe
'[,.exe'
addftinfo.exe
arch.exe
ash.exe
base32.exe
base64.exe
basename.exe
bash.exe
bunzip2.exe
bzipcat.exe
bzip2.exe
bzip2recover.exe
cal.exe
cat.exe
catman.exe
chcon.exe
chgrp.exe
chmod.exe
chown.exe
chroot.exe
cksum.exe
clear.exe
cmp.exe
col.exe
colcrt.exe
colrm.exe
column.exe
comm.exe
cp.exe
csplit.exe
cut.exe
cygcheck.exe
cygpath.exe
cygrunsrv.exe
cygstart.exe
cygwin-console-helper.exe
dash.exe
date.exe
getconf.exe
getent.exe
getfacl.exe
getopt.exe
gio-querymodules.exe
gkill.exe
glib-compile-schemas.exe
gobject-query.exe
grep.exe
grn.exe
grodvi.exe
groff.exe
grolbp.exe
grolj4.exe
grops.exe
grotty.exe
groups.exe
gsettings.exe
gzip.exe
head.exe
hexdump.exe
hostid.exe
hostname.exe
hpftodit.exe
iconv.exe
id.exe
indxbib.exe
info.exe
infocmp.exe
install.exe
install-info.exe
ipcmk.exe
ipcrm.exe
ipcs.exe
isosize.exe
join.exe
kill.exe
lastlog.exe
mknod.exe
mkpasswd.exe
mkshortcut.exe
mktemp.exe
more.exe
mount.exe
mv.exe
namei.exe
nice.exe
nl.exe
nohup.exe
nproc.exe
numfmt.exe
od.exe
openssl.exe
p11-kit.exe
passwd.exe
paste.exe
pathchk.exe
peflags.exe
perl.exe
perl5.22.2.exe
pfbtops.exe
pg.exe
pic.exe
ping.exe
pinky.exe
pkg-config.exe
pldd.exe
post-grohtml.exe
pr.exe
preconv.exe
pre-grohtml.exe
printenv.exe
printf.exe
ps.exe
ptx.exe
pwd.exe
sleep.exe
soelim.exe
sort.exe
split.exe
ssh.exe
ssh-add.exe
ssh-agent.exe
ssh-keygen.exe
ssh-keyscan.exe
ssp.exe
stat.exe
stdbuf.exe
strace.exe
stty.exe
sum.exe
sync.exe
tabs.exe
tac.exe
tail.exe
tailf.exe
tar.exe
tbl.exe
tclsh8.5.exe
tee.exe
test.exe
tfmtodit.exe
tic.exe
timeout.exe
toe.exe
touch.exe
tput.exe
tr.exe
troff.exe
true.exe
truncate.exe
trust.exe
tset.exe
tsort.exe
```

Direct manipulation: nouns

XEROX 6085 Workstation

User-Interface Design

To make it easy to compose text and graphics, to do electronic filing, printing, and mailing all at the same workstation, requires a revolutionary user interface design.

Bit-map display - Each of the pixels on the 19" screen is mapped to a bit in memory; thus, arbitrarily complex images can be displayed. The 6085 displays all fonts and graphics as they will be printed. In addition, familiar office objects such as documents, folders, file drawers and in-baskets are portrayed as recognizable images.

The mouse - A unique pointing device that allows the user to quickly select any text, graphic or office object on the display.

See and Point

All functions are visible to the user on the keyboard or on the screen. The user does filing and retrieval by selecting them with the mouse and loading the MOVE, COPY, DELETE or PROPERTIES command keys. Text and graphics are edited with the same keys.

Shorter Production Times

Experience at Xerox with prototype workstations has shown shorter production times and thus lower costs, as a function of the percentage of use of the workstation. The following equation can be used to express this:

$$T = \frac{1}{1 - P}$$

where T is the total time, P is the percentage of use of the workstation.

Table 1: Percentages of use of methods

YEAR	Non 6085	6085
1978	15.2	15.8
1980	41.1	39.3
1982	45	55
1984	30	70
1986	10	90
1988	5	95

Activity under the old and the new

Figure 1: Data from Table 1 drive

Text and Graphics

To replace typesetting, the 6085 offers a choice of type fonts and sizes from 4 point to 36 point.

Here is a sentence of 18 point text.

18-point text.

24-point text.

36-point text.

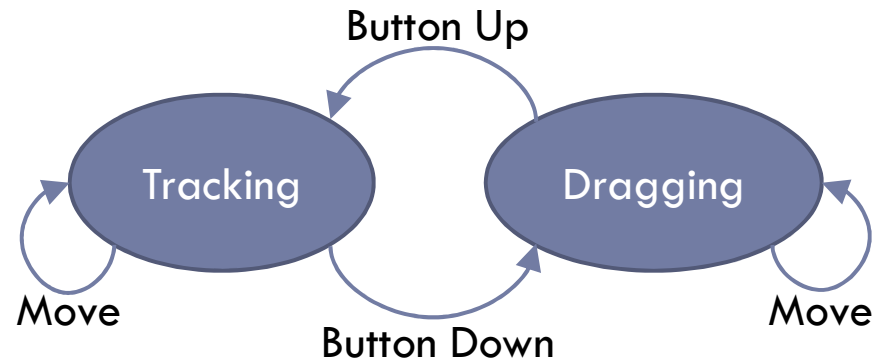
File Manager

- Brother Domini
- Calendar
- Calc
- Loader
- Blank User Dictionary
- Empty Dictionary
- Blank Record File
- Blank Document
- Monthly Profile
- Blank Folder
- Blank Canvas
- Blank Book
- Example ViewPo
- Remote Files
- Blank Reference
- Directory

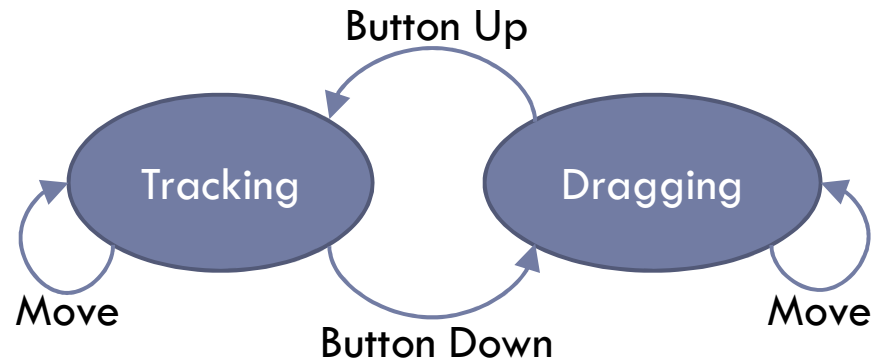
Taskbar

- Drawers in Japan
- Mickey
- OSBU
- Xerox
- Tape Drive
- Floppy Drive
- Wastebasket

Mouse state model (“mouse verbs”)

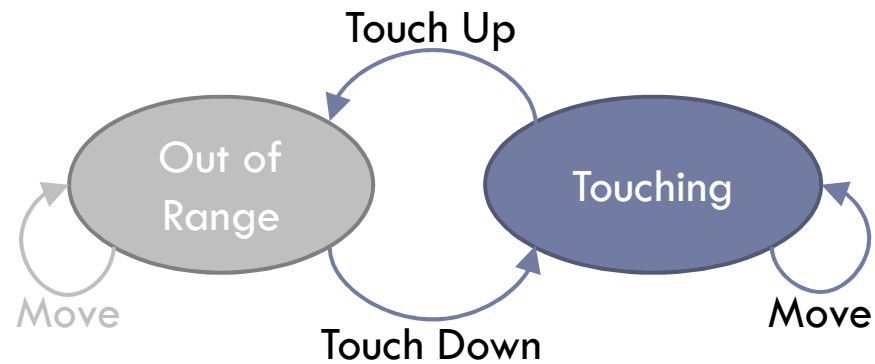


Mouse state model (“mouse verbs”)



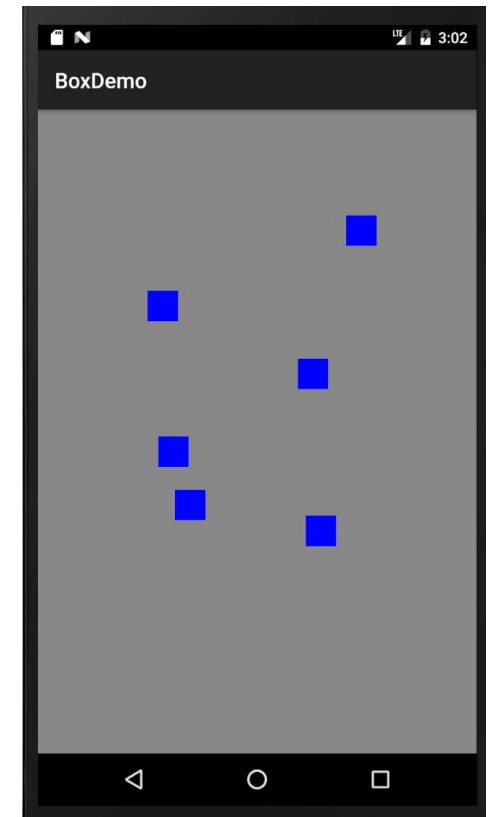
These verbs are heavily *overloaded* in direct-manipulation systems: one action can mean many things, depending on context

Touchscreen state model



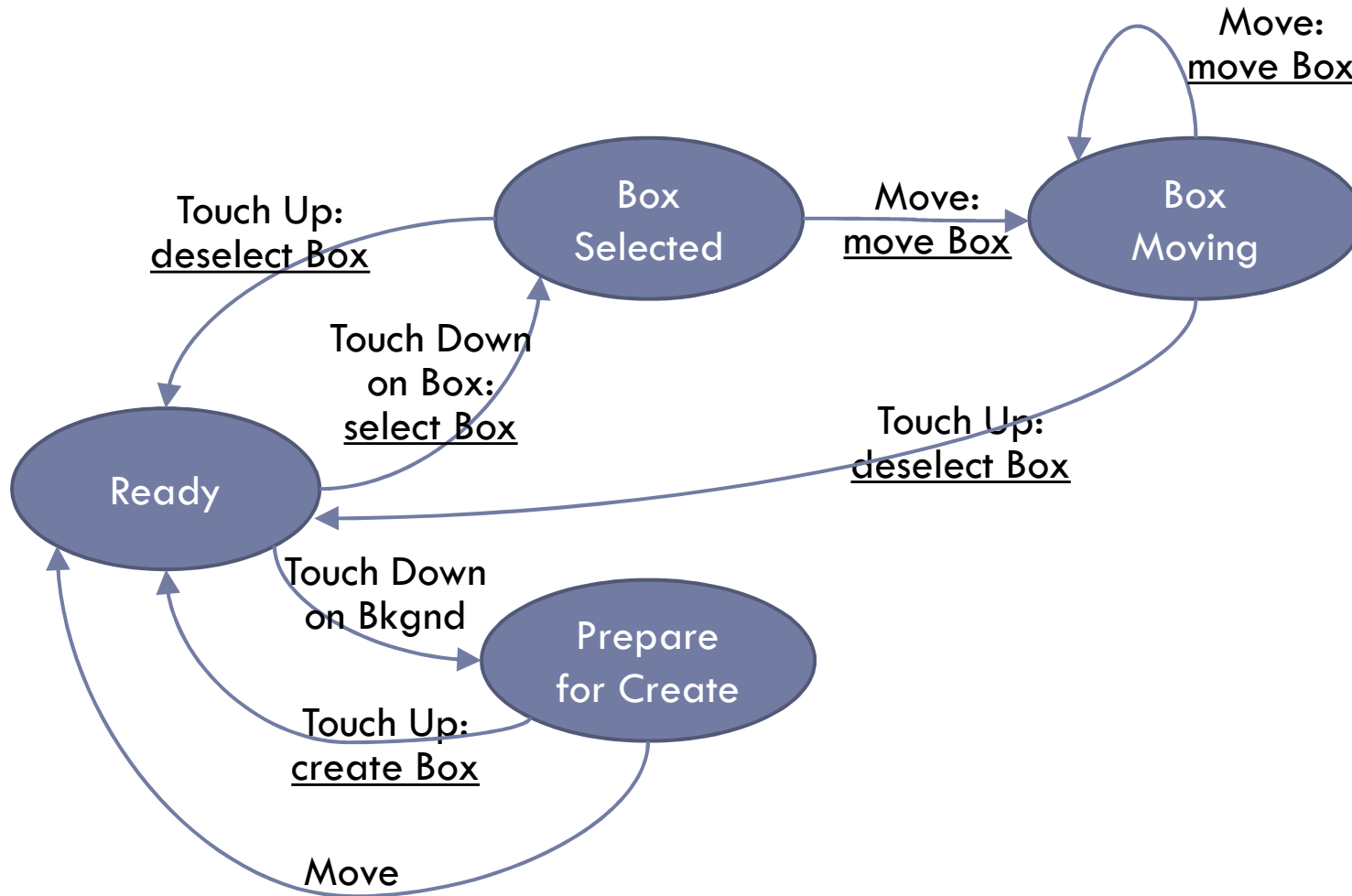
BoxDemo touch interaction

- Touch Down action should:
 - select box OR start create
- Touch Up action should:
 - create box OR finish drag OR nothing
- Move action should:
 - drag box OR cancel create
- How to keep track of all this?

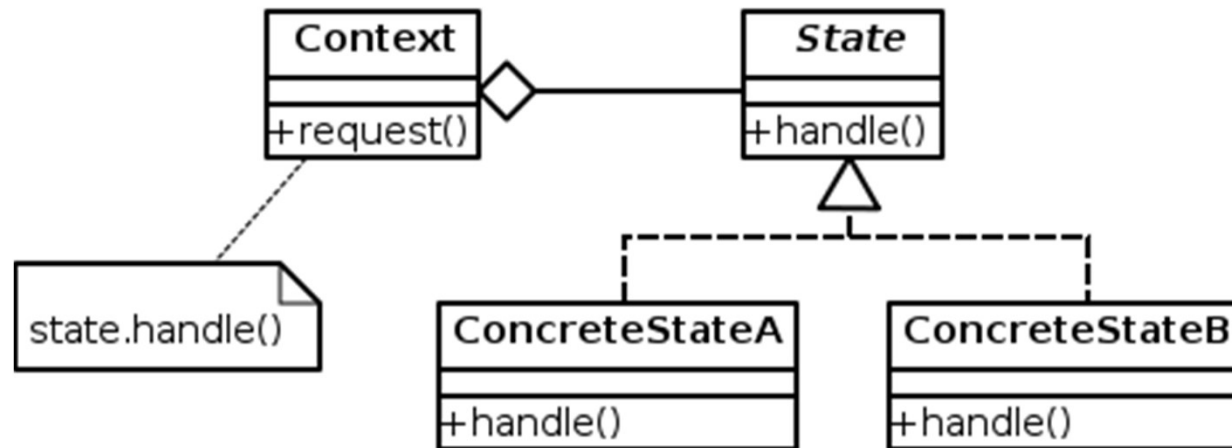


BoxDemo touch interaction

BoxDemo interaction state model



Implementation: State pattern



Implementation: State pattern

```
public class InputReadyState implements InputState{

    public void handleTouch(BoxViewController context, MotionEvent event) {
        switch (event.getAction()) {
            case MotionEvent.ACTION_DOWN:
                // if on a box, select
                if (context.model.contains(event.getX(),event.getY())) {
                    context.selected = context.model.findClick(event.getX(),event.getY());
                    context.view.invalidate();
                    context.bState = new InputSelectedState();
                } else {
                    // on background, so prepare for create
                    context.bState = new InputPrepareState();
                }
                break;
        }
    }
}
```

Event / Context / Side effects

