

Software Control of Home Automation Systems

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Abstract

Software can greatly enhance existing hardware home automation systems, giving them *smarts*. This talk covers many software programs for home automation.

Dumb Home Automation Devices

- Timers
- Clapper
- Dawn/Dusk Sensors
- Motion Sensors

My other presentation, *Practical Computerized Home Automation*, covers the hardware aspects of home automation.

What Does Software Control Enable?

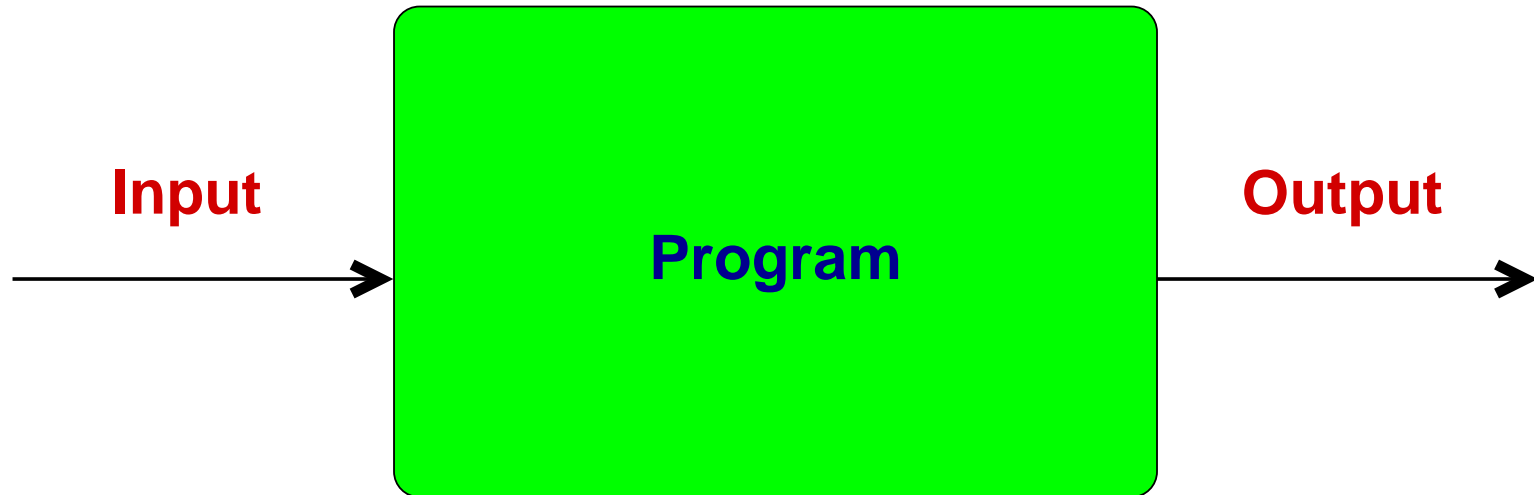
- Device behavior can be combined
- No distance limitations
- Activity detection
- Fully programmable / scriptable
- Access to external data

How Is This Possible?

Home Networks

- Wired telephone
- Cordless telephone (900MHz, 2.4GHz, 5.8 GHz, 1.9GHz)
- Wireless remotes
- Wired local area network (Ethernet)
- Wireless local area network (802.11)
- Electrical (X10)

Software Control



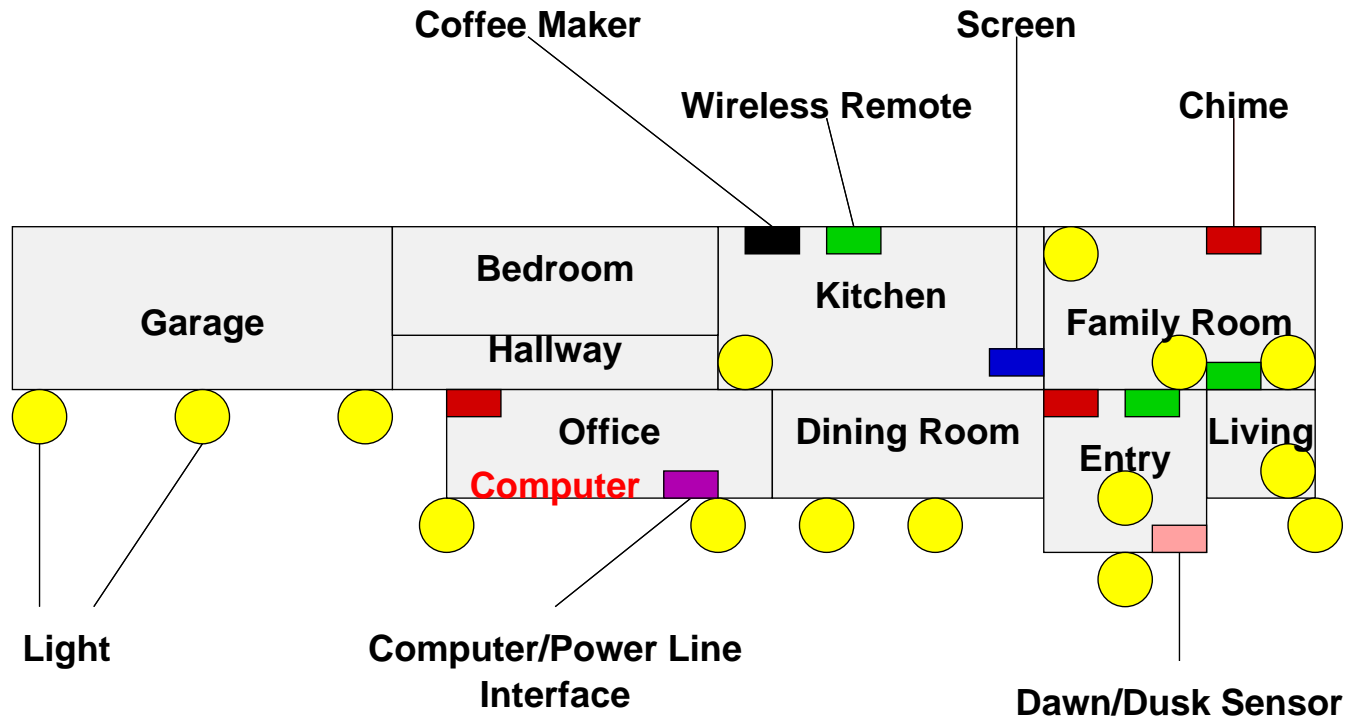
Inputs

- User commands
- Clock/Timer
- Dawn/Dusk sensors
- Wireless remotes
- Caller Id
- Telephone Dialing
- Web sites, e.g. outside temperature

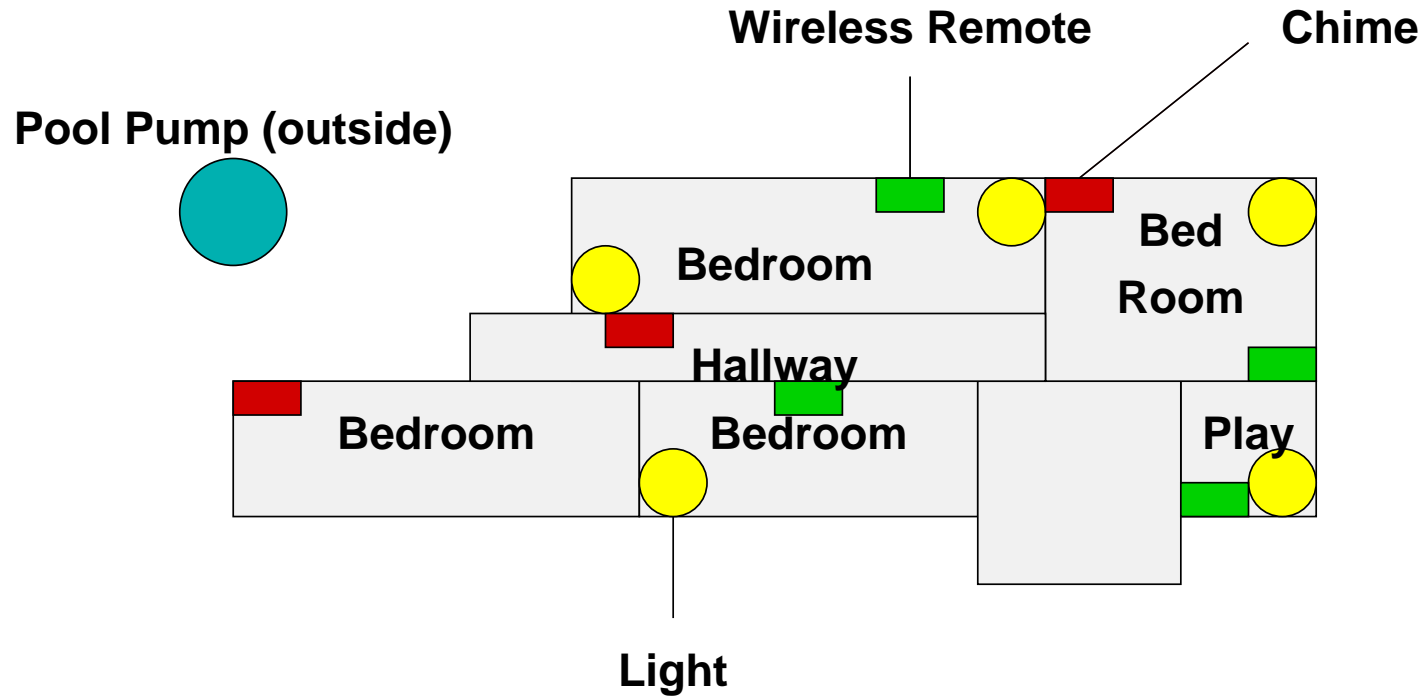
Outputs

- Lights
- Motors
- Appliances, e.g. coffee maker
- Sounds
- Network broadcast messages
- Slideshow

Home Application: First Floor



Home Application: Second Floor



Heyu

X10 devices are controlled and monitored using the X10 CMI 1a computer interface device and the open source *heyu* control software. For heyu information, see <http://www.heyu.org/>. Heyu can be customized by defining devices in `~/.x10config`:

```
remotebed      I 1      # downstairs remote alloff
entrytable     I 2
bookcase       I 3
couch          I 4
tiffany        I 5
schoolroom     I 6
fireplace      I 7
laundry        I 8
wireless       I 9      # wireless outlet, makes click noise
masterbed      I 10
...

```

Heyu Wrapper Script

Instead of:

```
$ heyu turn couch on
```

a script can be created:

```
$ x10on couch
```

The script can handle multiple devices:

```
$ x10on tiffany bookcase
```

and groups of devices can be defined:

```
$ x10off video
```

Simple Time-Based Activity



Crontab Scheduler

```
0 7 * * *      root x10on slideshow
0 11 * * *     root x10on decor
0 12 * * *     root touch /u/x10/wait_for_dusk
0 14 * * *     root x10on bathroom
30 20 * * *    root x10on boyscolor catherine
# fade
30 21 * * *    root x10dim entrytable decor bathroom
# off
0 21 * * *     root x10off bookcase
0 23 * * *     root frontlights off; x10off decor tiffany
0 0 * * *      root x10off 'x10group 1 | egrep -v '^entrytable$''
0 0 * * *      root touch /u/x10/wait_for_dawn
59 0 * * *     root x10dimoff_slow laundry
59 1 * * *     root ! is_tz_fallback && x10alloff
```

Dawn/Dusk Activity



Monitoring X10 Activity

```
7/6 at 05:40:49 address unit 8 : housecode d (entrymotion_dusk)
7/6 at 05:40:49 function      Off : housecode d unit 8 (entrymotion_dusk)
7/6 at 20:35:57 address unit 8 : housecode d (entrymotion_dusk)
7/6 at 20:35:57 function      On  : housecode d unit 8 (entrymotion_dusk)
7/6 at 22:05:46 address unit 3 : housecode f (catherine)
7/6 at 22:05:46 function      Off : housecode f unit 3 (catherine)
7/5 at 23:18:20 address unit 13 : housecode i (remotebed2)
7/5 at 23:18:21 function      Off : housecode i unit 13 (remotebed2)
```

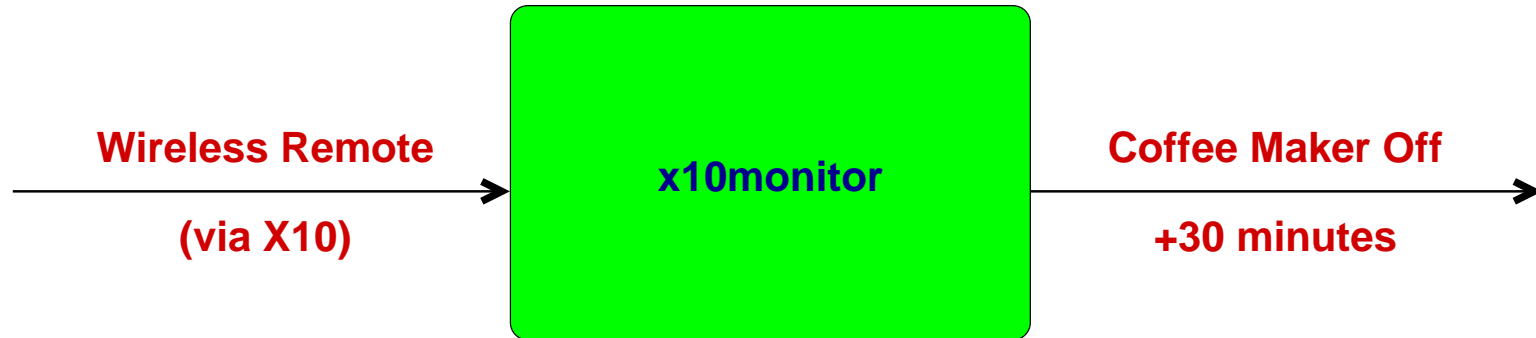
Acting on X10 Events (Dusk)

```
x10 monitor | while read LINE
do
    echo "$LINE" >>/var/log/x10
    case "$LINE" in
        # is it dusk?
        *" On : "*" (entrymotion_dusk) "*" )
            if [ -f /u/x10/wait_for_dusk ]
            then    rm /u/x10/wait_for_dusk
                   x10on 1
                   echo "heyu turn masterbath on;
                        heyu turn laundry on" |
                        at now +45 minutes
            fi
        ;;
    esac
done
```

X10 Already Supports Wireless Remotes

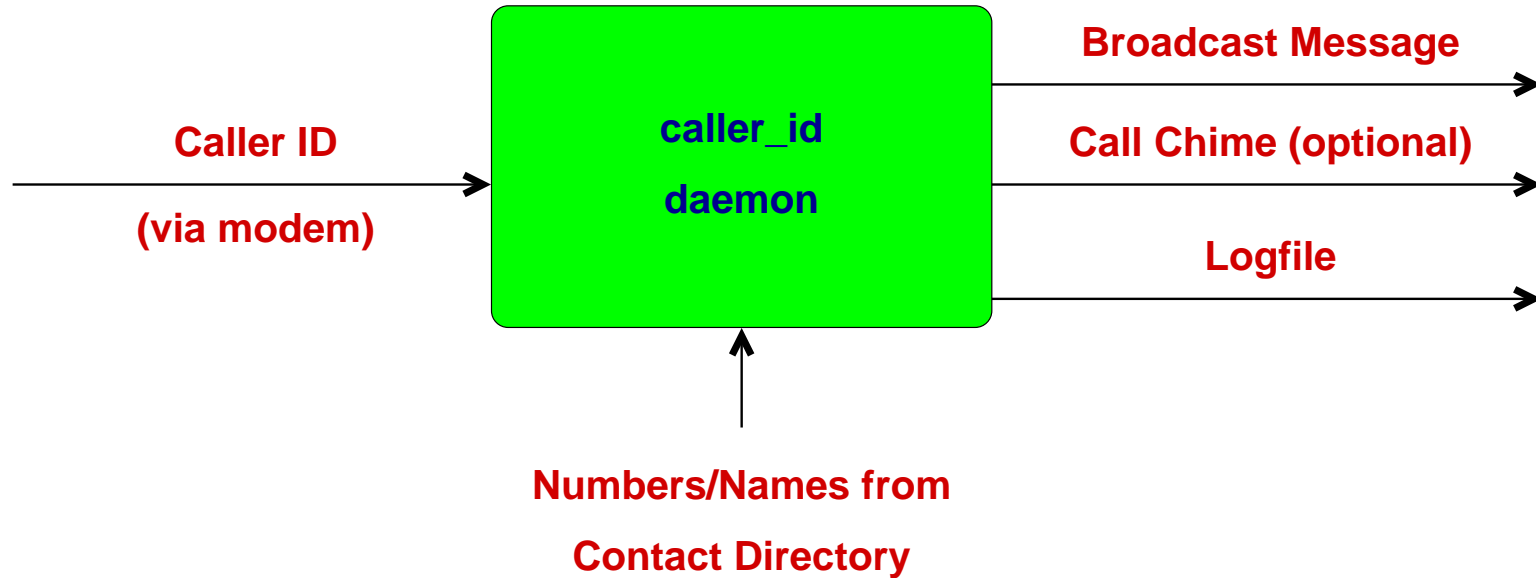


Coffee Maker Timer



```
*" On : "*" (coffeepot "*" ) "*"
    echo "heyu turn coffeepot off" | at now +30 minutes
    ;;
```

Telephone Notification



Caller ID

AT#CID=1

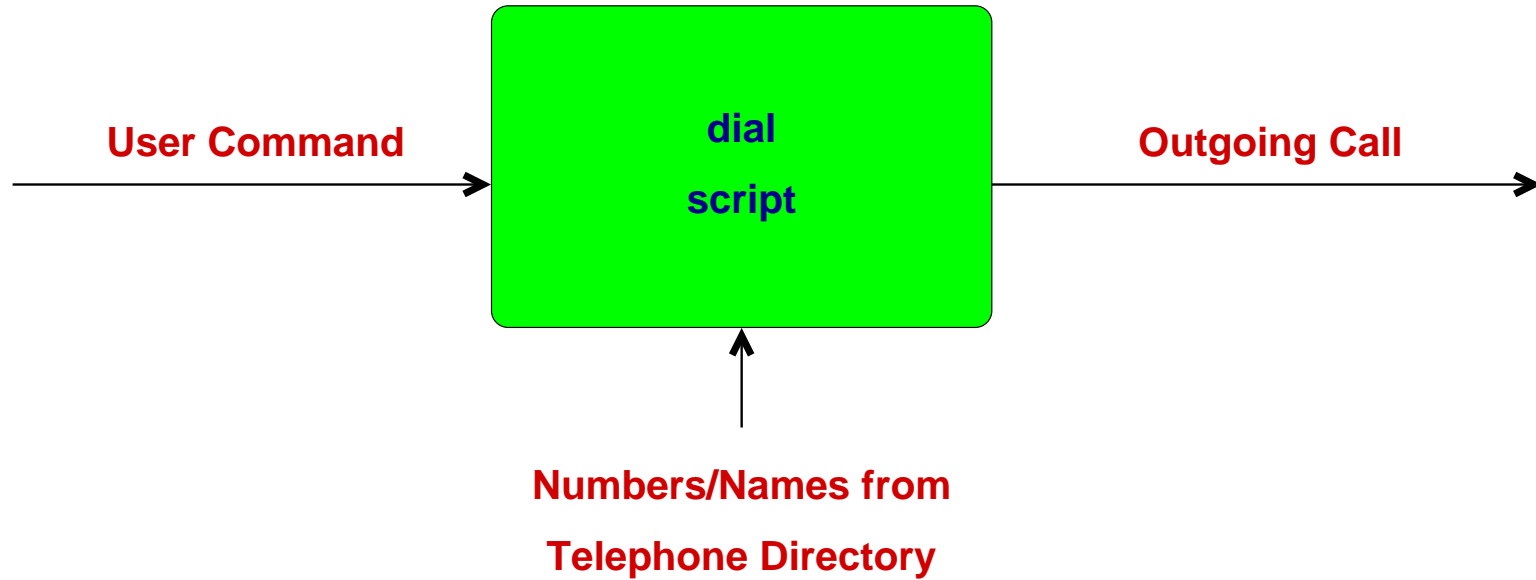
```
Wed Jul 8 21:34:00 EDT 2009 DATE = 0708  
Wed Jul 8 21:34:00 EDT 2009 TIME = 2134  
Wed Jul 8 21:34:00 EDT 2009 NMBR = 6107429657  
Wed Jul 8 21:34:00 EDT 2009 NAME = PENNSYLVANIA
```

Lookup phone number in contact directory.

```
Wed Jul 8 21:34:04 EDT 2009 Bruce and  
Christine Momjian from Bruce's cell phone (610) 742-9657
```

Log call, and optionally sound X10 chime if phone call is from an important phone number.

Outgoing Calls



Telephone Dialing

Dial phone number from contact directory:

```
ATDT16107429657
```

```
Tue Apr 7 14:57:26 EDT 2009 16107429657 Bruce and  
Christine Momjian to Bruce's cell phone
```

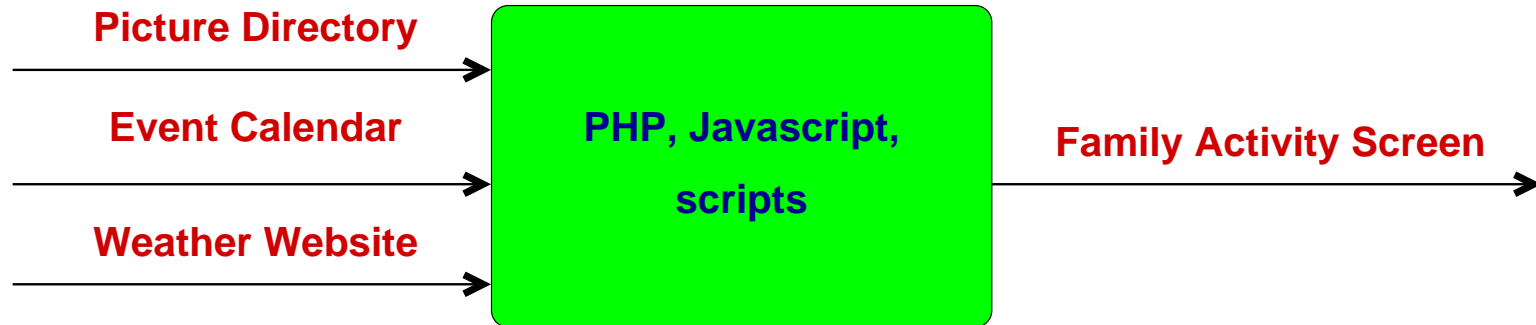
This can also be used to automatically dial recently received calls using the log.

Pool Pump



A script allows scheduled pump control with manual override.

Family Activity Screen

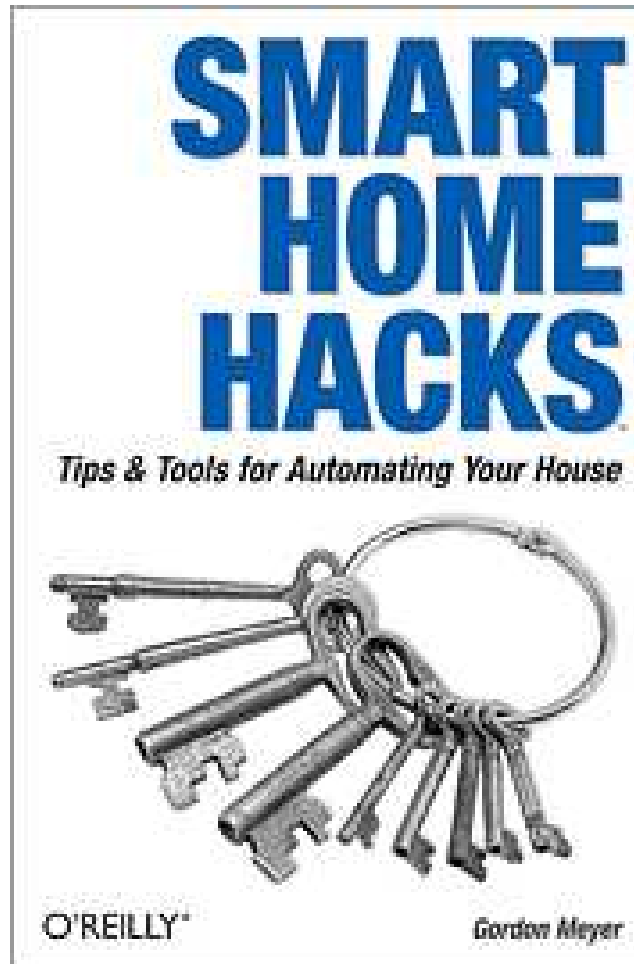


Screen is shown on a dummy display and also on laptops throughout the house. Source available at <http://code.google.com/p/infodisp>.

Time to Eat



Conclusion



<http://momjian.us/presentations>