H79.2580

mobile application design

week 1

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  Setting up your environment, writing your first program ("Hello Mob!"), homework

What is mobile?

Mobile

Mobile or *cellular* phone - a portable, handheld communication device connected to a wireless network that allows users to make voice calls, send text messages and run applications.

WARNING: Jargon-heavy

Mobile phones, cellular phones, keitai, handy phone, cells wireless phones, PDAs

Phones are:

➡small
➡one handed
➡limited input methods
➡limited processing power
➡sensor rich
➡limited battery life
➡numerous technologies

CDMA

GPRS

TDMA

Colour Screen

PTT

A-GPS

WAP

GSM

Speaker

Camera

WiFi

Bluetooth

GPS

Microphone

Mobile evolution (briefly)

G - 1/2/3/4 G

G refers to the different generations of mobile devices.

First generation (1G) cellphones were analog devices. Second generation (2G) devices were digital, and third generation (3G) allows for voice, data and advanced services.

0G

1946-1980's

Early mobile phones

- Expensive
- In cars/trucks/briefcases

Voice only

1G

1980's-now

- First generation cellular networks
- Radio signals = analog
- Technologies - AMPS / DataTac
- First Blackberry (850)
- Voice + Limited data

2G

1990's-now

- Second generation cellular networks
- Digital. Voice + SMS + Circuit switched data
- GSM, iDEN, CDMA, TDMA

2.5G

1990's-now

- Marketing term
- GPRS, HSCSD, WiDEN
- Also EDGE, CDMA2000 1x-RTT

GPRS

General Packet Radio Services

A mobile data service for use on GSM networks.

Part of the 2.5G standards family

GSM

Global System for Mobile Communications

GSM is the most popular standard for mobile phones worldwide used by 2 billion people on over 210 networks.*

US Operators = T-Mobile, Cingular

* according to this http://en.wikipedia.org/wiki/GSM

iDEN

Integrated Digital Enhanced Network

A second generation (2G) mobile telecommunications standard developed by Motorola.

US Operators = Sprint-Nextel / Boost

CDMA

Code Division Multiple Access

A popular second generation (2G) standard for mobile phones.

US Operators = Sprint, Verizon

3G

2004-now

- Third generation cellular networks
- Broadband data + voice, streaming video!
- W-CDMA (UMTS, FOMA), 1xEV-DO

4G

the future!

- “high-speed broadband for data- and visual- centric information”
- Transmits data at 100mbps while moving and 1Gbs while standing still

some refreshing statistics

- **3.2m** Blackberries
- **50m** PDAs
- **70m** iPods
- **190m** Gameboys
- **820m** PCs
- **1.5bn** TV sets
- **2bn** Mobile phones*

Source: Charlie Schick's blog - http://cognections.typepad.com/lifeblog/2006/08/eh_kinda_quiet_.html

Why mobile?

5 reasons why mobiles rock

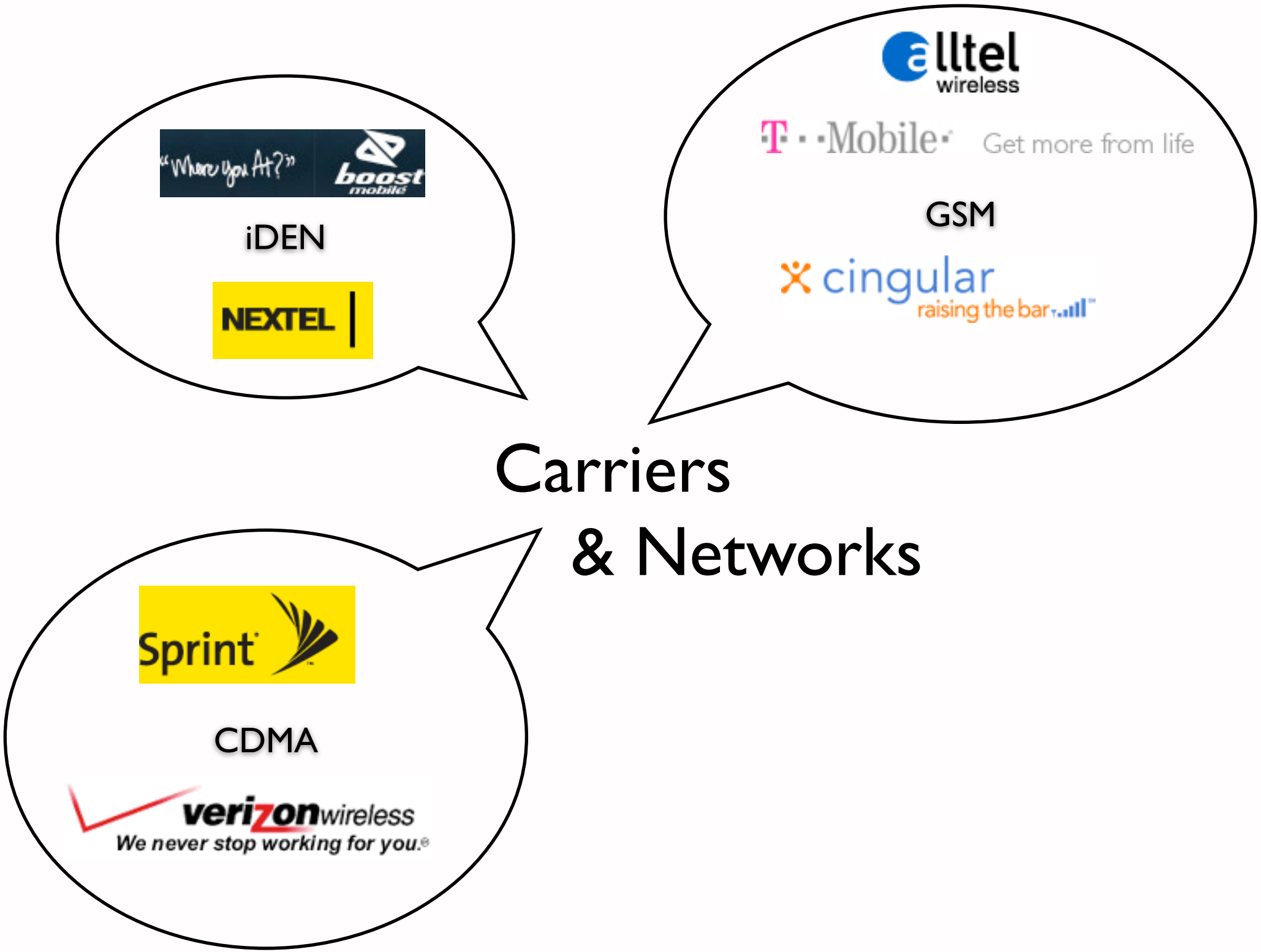
1. Phones are personal, portable devices (easy to decorate!)
2. Sensory overload (eyes, ears, touch)
3. Can be used almost anywhere
4. Fun! Programmable! Vaguely hackable.
5. Direct link to closest friends / family

The Mobile Ecosystem

Developing for Mobile (mainly in the US)

Service	Cingular	Verizon	Sprint	T-Mobile
Subscribers	55.8m	53.0m	50.9m	22.7m
Technology	GSM	CDMA	CDMA/ iDEN	GSM
Platform	J2ME	BREW	J2ME	J2ME
Garden	Open	Semi-Walled	Walled	Semi-Walled
Network	2.5G/3G	2.5G	2.5G	2.5G/3G
Location	TDOA (no access)	A-GPS	A-GPS	TDOA (no access)

	Feature phones	**Smart phones**	**PDAs**
Price	Cheap	Medium	Pricy
OS	Proprietary, Series40	S60, Windows Mobile	PalmOS, PocketPC
Processing	Slowish...	Faster	Fastest
			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boost
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iDEN
NEXTEL
Carriers
& Networks
Sprint
CDMA
verizon wireless
We never stop working for you.

Sprint (Nextel + Boost), T-Mobile & Cingular* support J2ME

* 3 out of the 4 largest carriers
(but who's counting anyway?)

Development Languages

	Language	Cost	Learning Curve	Emulator	Availability
J2ME	Java	FREE	Average	Free	~708m
Flash Lite	AS	$$	Average	With IDE	77m
Symbian	C++	FREE	STEEP!	Free	120m
.NET	C#, C++, VB.NET	$$$$	STEEP!	IDE	4.5m
BREW	C++	$$$$	STEEP!	Simulator	????
Python	Python	FREE	Gentle	Add-on	????
Browser	XHTML, WML	FREE	Gentle	Free	2bn+

sources: http://www.biskero.org/?p=430, http://alindh.iki.fi/2006/06/27/mobile-platform-statistics/, http://en.wikipedia.org/wiki/Mobile_development

Enough figures! What is this J2ME thing anyway?

J2ME / Java ME

Java ME (formerly known as Java 2 Platform, Micro Edition or J2ME), is a collection of Java APIs for developing software on resource constrained devices such as PDAs, cell phones and other consumer appliances.

Java Sources

- Java Community Process - http://jcp.org
  - JSR specification requests
  - reference implementations
- Sun - http://java.sun.com
  - SDK, tools, community
- Manufacturer
  - SDKs, community, device emulators

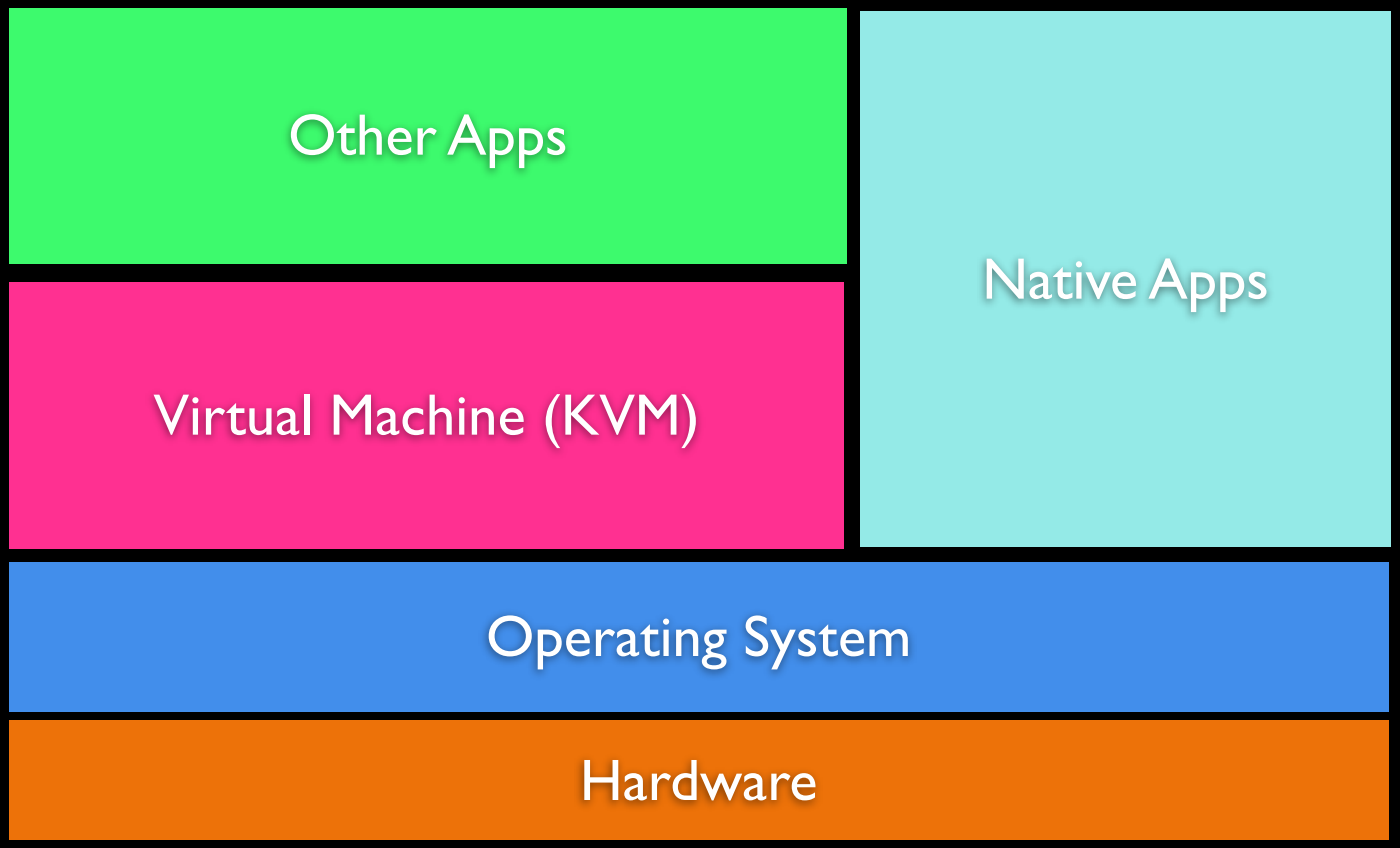
Java ME

Configurations
- specifies minimum Java technology that we can expect for certain devices
- Includes language, virtual machine features, core libraries

Profiles
- layer defining APIs and specifications for a particular device or market - MIDP, FP
- MIDlets

Optional Packages
- includes additional functionality only supported by certain devices - e.g. Bluetooth API, Location API

Java VM


Other Apps
Native Apps
Virtual Machine (KVM)
Operating System
Hardware

CLDC

Connected Limited Device Configuration

- specifies environment for mobile phone, pagers
- 160-512k of memory for Java
- limited power / batteries
- intermittent, low-bandwidth connectivity

CLDC 1.0
- May 2000, JSR 30
- java.lang

CLDC 1.1
- Dec 2002, JSR 139
- adds floating point support
- bug fixes

MIDP

Mobile Information Device Profile

MIDP 1.0
- December 2000, JSR 37
- java.microedition.midlet
- java.microedition.rms
- java.microedition.lcdui
- java.microedition.io.HttpConnection

MIDP 2.0
- Nov 2002, JSR 118
- java.microedition.media
- java.microedition.lcdui.game

MIDP 3.0
- Q3 2006? Soon?

Optional Packages

Bluetooth API (JSR 82)
- communication with Bluetooth devices

Wireless Messaging API (JSR 120, JSR 205)
- SMS, MMS, multi-part messages

Mobile Media API (JSR 135)
- audio, video and multimedia

Location API (JSR 179)
- interface to location services

MIDP 3.0

AKA “The Future”

- **Background MIDlets**
- **Enable drawing to secondary displays**
- **Improved large screen support**
- **Auto-start MIDlets**
- **And much more... to forget about for the moment**

MIDlets

MIDlets are like Java applets for mobile devices.

Has a lifecycle with four stages, created, started, paused, destroyed.

Building MIDlets

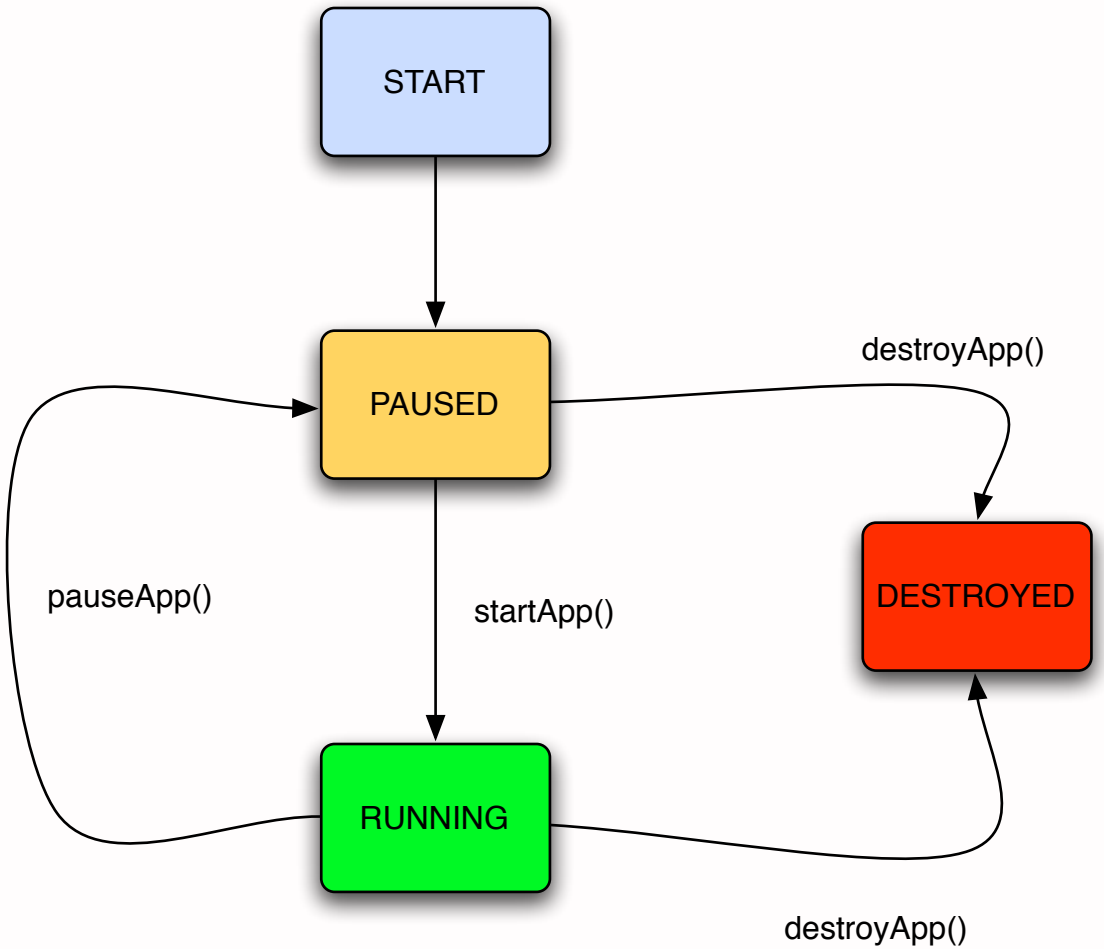
JADs and JARS
- Java Application Descriptor (JAD)
- Java Archives (JArs)

JAD
- describes MIDlet suite
- specifies name, icon, MIDlets, permissions

JAR
- contains class files, resources

AMS
- application management software

The Not-So-Secret Lives of MIDlets



Provisioning

AKA “getting it on the phone”

Over the Air (OTA)
- Web / WAP / Carrier Deck
- JAD file specifies location

Bluetooth
- Easy, quick installation

USB cable
- expensive
- difficult to obtain

Assignments!