

Upcoming Assignments

- Readings: Chapter 4 by today
- Horizontal Prototype due Friday, January 22
- Quiz 2 today at 2:40pm
- Lab Quiz next Friday during lecture time (2:10-3pm)
 - Have a development environment in 256 or 255
 - Be familiar with the application lifecycle
- Lab 2 due Wednesday, January 20
- Lab 3 assigned today
- Monday holiday, Tuesday Furlough

Forming Teams

- Opportunity to improve communication and networking skills
 - Essential skills for software engineers
- If you are still seeking a teammate, meet in 14-255 immediately after taking the quiz (around 2:55pm)
- Requests for larger teams will be entertained during lab today
- Let me know if you don't have at least one phone per team

Horizontal Prototype

- Purpose:
 - Capture scope, functionality, flow through system
- Prototype the UI for all features/use cases
 - All screens, controls, menus
- Capture the flow through the UI
 - Dialog map
- Feature list
- Tools (must be digital):
 - Images linked as web pages
 - Balsamiq
- Review on 1/22 – I will approve or ask for changes in scope

Application Lifecycle

- See flowchart in <http://developer.android.com/guide/topics/fundamentals.html>
- See Figure 3-8 in text
- Active lifetime
 - has focus, accepting UI events
 - onResume to onPause
- Visible lifetime
 - Visible, but does not have focus
 - onStart to onStop
- Full lifetime
 - onCreate to onDestroy

Active Lifetime Example

- Campus Maps
 - Turn on/off GPS to save battery when UI not in focus

```
@Override
protected void onPause() {
    super.onPause();
    //stop receiving GPS and Orientation data
    locationManager.removeUpdates(locationListener);
}
@Override
protected void onResume() {
    super.onResume();
    //restart receiving GPS and Orientation data
    locationManager.requestLocationUpdates(provider, 2000, 10,
                                           locationListener);
}
```

Visible Lifetime Example

- Campus Maps
 - Save state as app could get killed after onStop()

```
@Override
protected void onStop() {
    super.onStop();
    savePreferences();
}
@Override
protected void onStart() {
    super.onStart();
    restoreUIState();
}
```

Visible Lifetime Example

- Campus Maps
 - Save state as app could get killed after onStop()

```
private void savePreferences() {
    SharedPreferences cmSharedPreferences =
        getSharedPreferences(CMPREFS, Activity.MODE_PRIVATE);
    SharedPreferences.Editor editor = cmSharedPreferences.edit();
    editor.putBoolean(VIRTUAL_MODE, inVirtualMode);
    editor.putInt(MAP_INDEX, curMapIndex);
    editor.commit();
}
private void restoreUIState() {
    SharedPreferences cmSharedPreferences =
        getSharedPreferences(CMPREFS, Activity.MODE_PRIVATE);
    inVirtualMode = cmSharedPreferences.getBoolean(VIRTUAL_MODE, true);
    curMapIndex = cmSharedPreferences.getInt(MAP_INDEX, 0);
}
```

UI Elements

- View
 - Control
 - ViewGroup
 - Layout
 - Widget (Compound Control)
- Many expected Views
 - Button, CheckBox, RadioButton
 - TextView, EditText, ListView
 - Can be customized by extending and overriding `onDraw()`

XML UI Configuration

- Layouts can specify UI elements (provided and custom)
- res/layout
- Lab 3 will explore this

Campus Maps Example

- See `res/layout/main.xml`

```
@Override
public void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.main);
}
```

Custom View Example

- Campus Maps

```
public class CampusMapView extends View {
    @Override
    public void onDraw(Canvas canvas) {
        super.onDraw(canvas);
        if (image != null) {
            drawMapWithCircle(canvas);
            drawCompass(canvas);
        }
    }
    private void drawMapWithCircle(Canvas canvas) {
        image.draw(canvas); //...
        Paint paint = new Paint();
        paint.setColor(getResources().getColor(R.color.myLocationOuter));
        canvas.drawCircle(circleX, circleY, 10, paint); //...
    }
};
```

Menu

- Icon Menu (up to 6 icons)
- Expanded Menu (from More on Icon Menu)
- Submenus

Static Menu Example

- Campus Maps : onCreateOptionsMenu

```
@Override
public boolean onCreateOptionsMenu(Menu menu) {
    super.onCreateOptionsMenu(menu);
    //Help menu
    menu.add(0, MENU_HELP, Menu.NONE, R.string.menu_help);
    //Virtual toggle menu
    menu.add(0, MENU_VIRTUAL, Menu.NONE, R.string.menu_item_virtual_off);
    if (VERSION==VERSION_SINGLE) {
        return true; // do no more
    }

    //Choose favorite menu
    SubMenu changeMapMenu = menu.addSubMenu(0, MENU_CHANGE_MAP,
    Menu.NONE, R.string.menu_change_map);
    changeMapMenu.add(0, MENU_CHANGE_0, 0, favCampusMaps[0].title);
    changeMapMenu.add(0, MENU_CHANGE_1, 1, favCampusMaps[1].title);
    changeMapMenu.add(0, MENU_CHANGE_2, 2, favCampusMaps[2].title);
    ...
}
```

Handle Menu Selection

- Campus Maps : onOptionsItemSelected

```
@Override
public boolean onOptionsItemSelected(MenuItem item) {
    super.onOptionsItemSelected(item);
    switch (item.getItemId()) {
        case MENU_HELP: {
            Toast.makeText(CampusMapsActivity.this,
                "If you don't see a map, check your internet
connectivity (mobile data or wifi).", Toast.LENGTH_LONG).show();
            return true;
        }
        case MENU_VIRTUAL: {
            if (VERSION == VERSION_TRIAL) {
                Toast.makeText(CampusMapsActivity.this, "Only
virtual mode available in trial version.", Toast.LENGTH_LONG).show();
            } else {
                inVirtualMode = !inVirtualMode; //toggle
                setupLocationService();
            }
        }
    }
}
```

Dynamic Menu Example

- Campus Maps : onPrepareOptionsMenu

```
@Override
public boolean onPrepareOptionsMenu(Menu menu) {
    super.onPrepareOptionsMenu(menu);
    MenuItem mi = null;
    mi = menu.findItem(MENU_VIRTUAL);
    if (inVirtualMode)
        mi.setTitle(R.string.menu_item_virtual_off);
    else
        mi.setTitle(R.string.menu_item_virtual_on);
    if (VERSION==VERSION_SINGLE) {
        return true; // do no more
    }
    if (newMapAdded) {
        menu.setGroupVisible(0, false);
        menu.setGroupVisible(1, true);
    }
    else {
```