SUBVERSION, OBJECTS, AND GRAPHICS

CSSE 120 – Rose-Hulman Institute of Technology

Software Engineering Tools

- The computer is a powerful tool
- We can use it to make software development easier and less error prone!
- Some software engineering tools:
  - IDEs, like Eclipse
  - Version Control Systems—like Subversion
  - Diagramming applications—like Violet or Visio
  - Modeling languages—like Alloy, Z, or JML

Version Control Systems

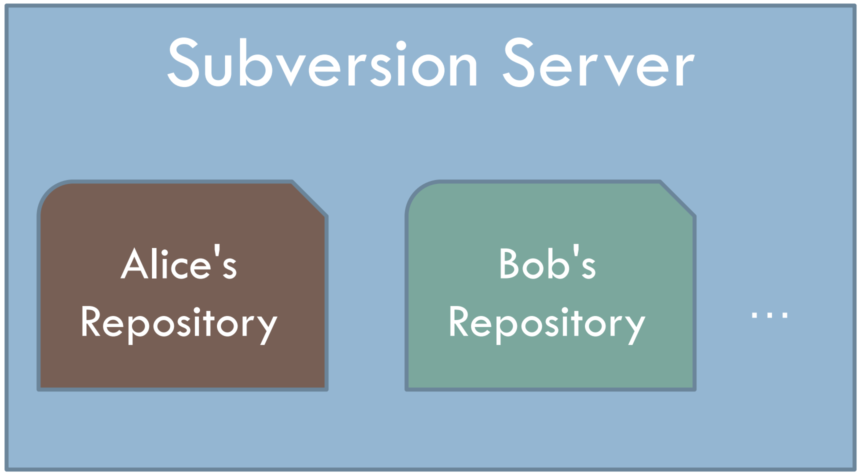
- Store "snapshots" of all the changes to a project over time
- Benefits:
  - Allow multiple users to share work on a project
  - Act as a "global undo"
  - Record who made what changes to a project
  - Maintain a log of the changes made
  - Can simplify debugging
  - Allow engineers to maintain multiple different versions of a project simultaneously

Our Version Control System

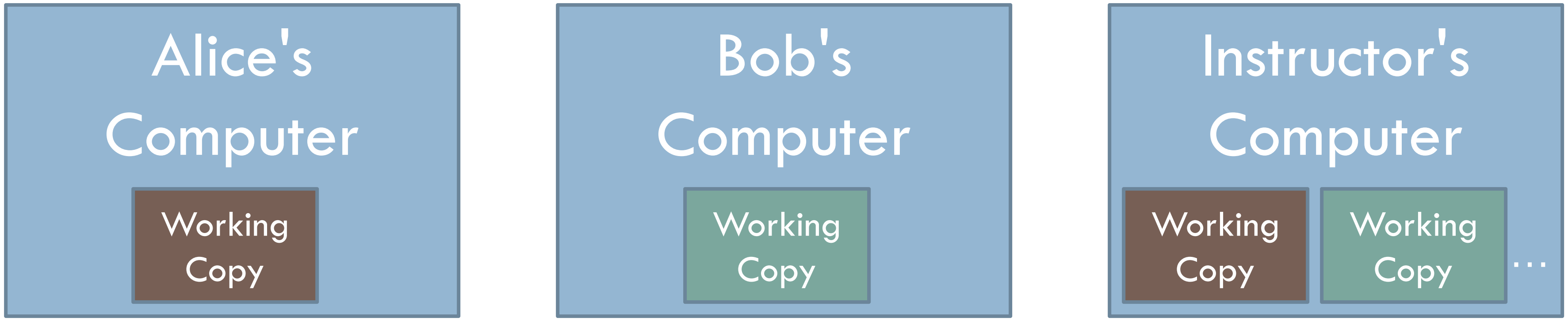
- Subversion, sometimes called SVN
- A free, open-source application
- Lots of tool support available
  - Works on all major computing platforms
  - **TortoiseSVN** for version control in Windows Explorer
  - **Subclipse** for version control inside Eclipse

Version Control Terms

Repository: the copy of your data on the server, includes ***all*** past versions

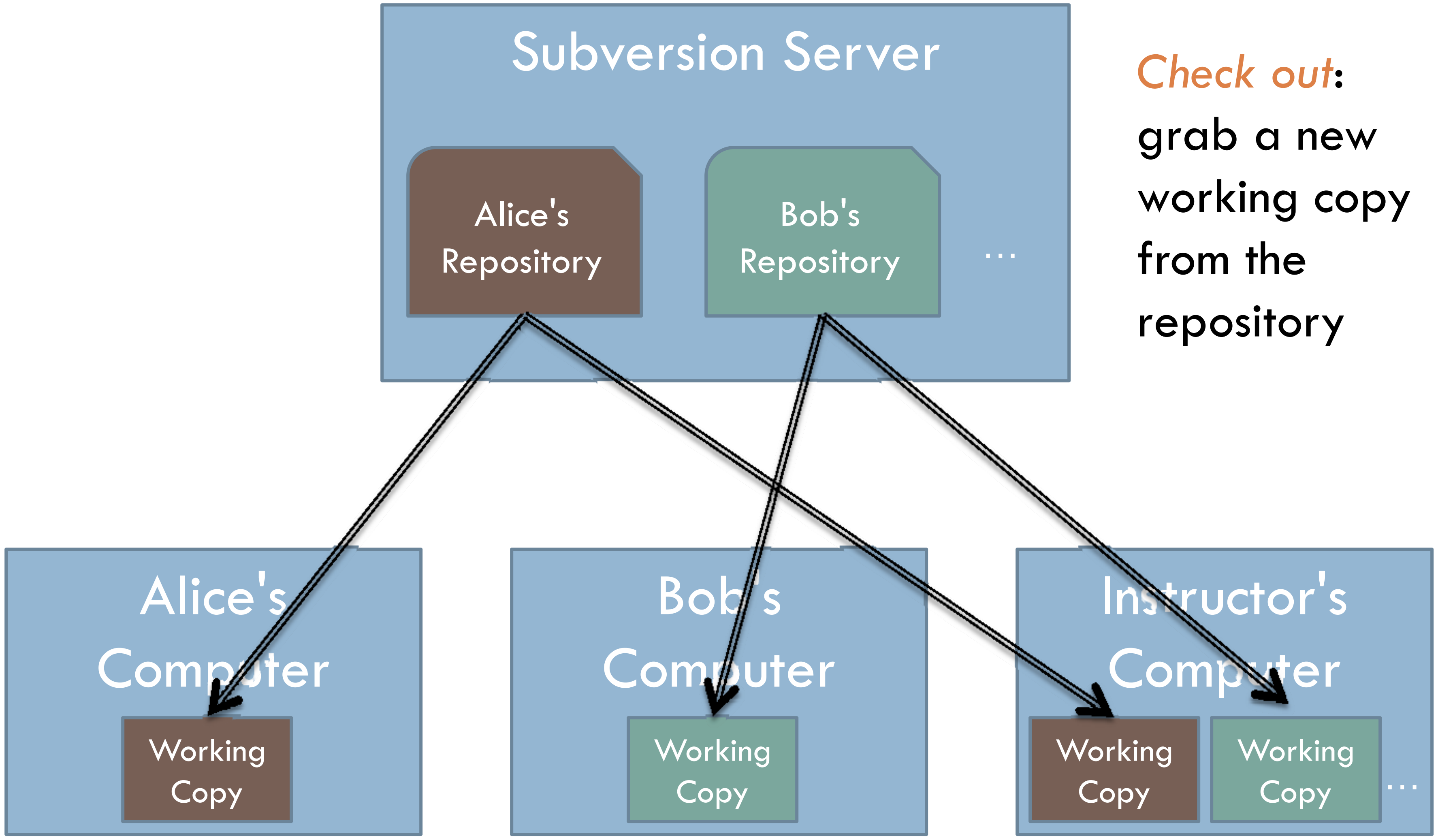


Working copy: the ***current*** version of your data on your computer



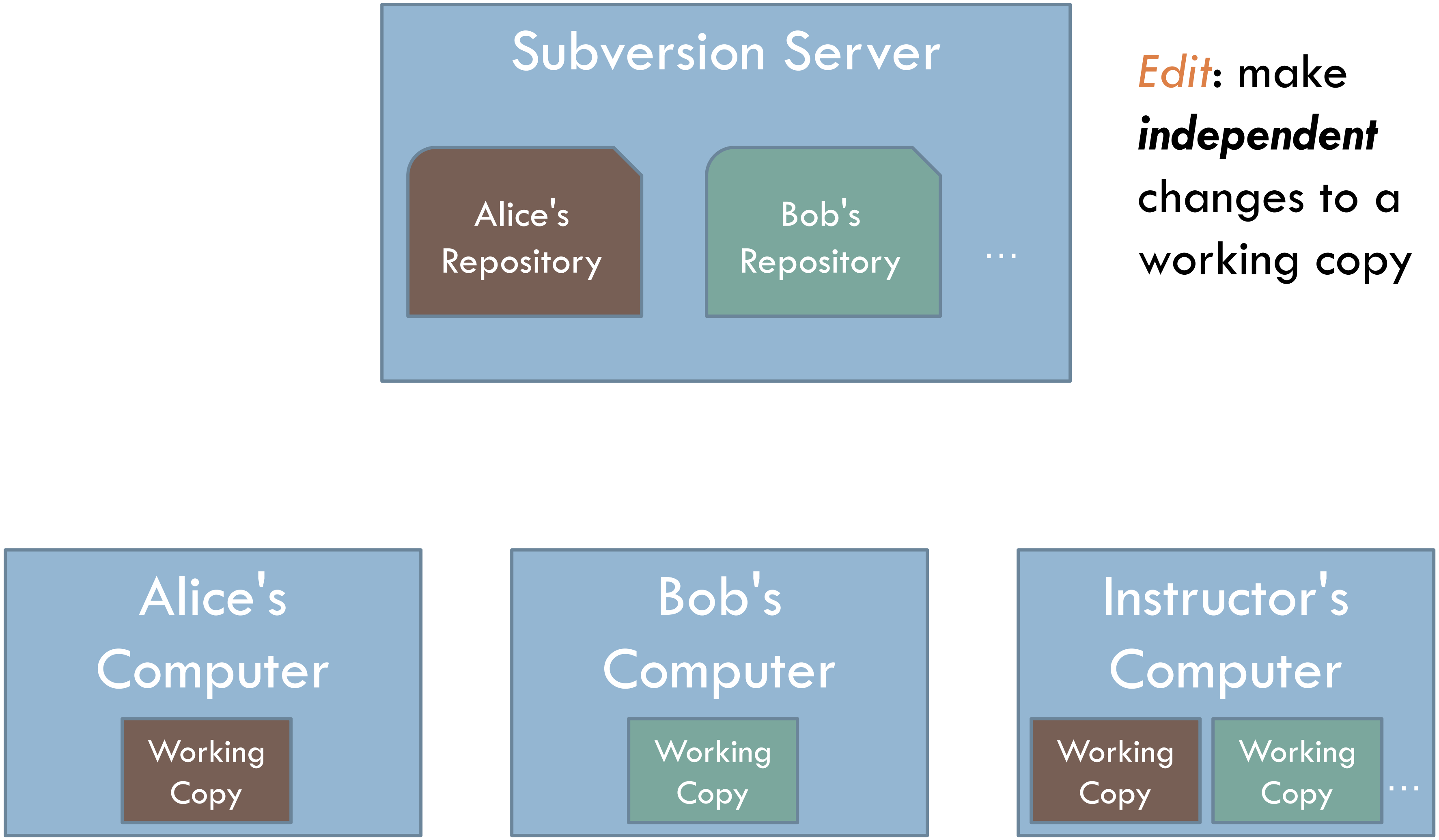
Q1b

Version Control Steps—Check Out



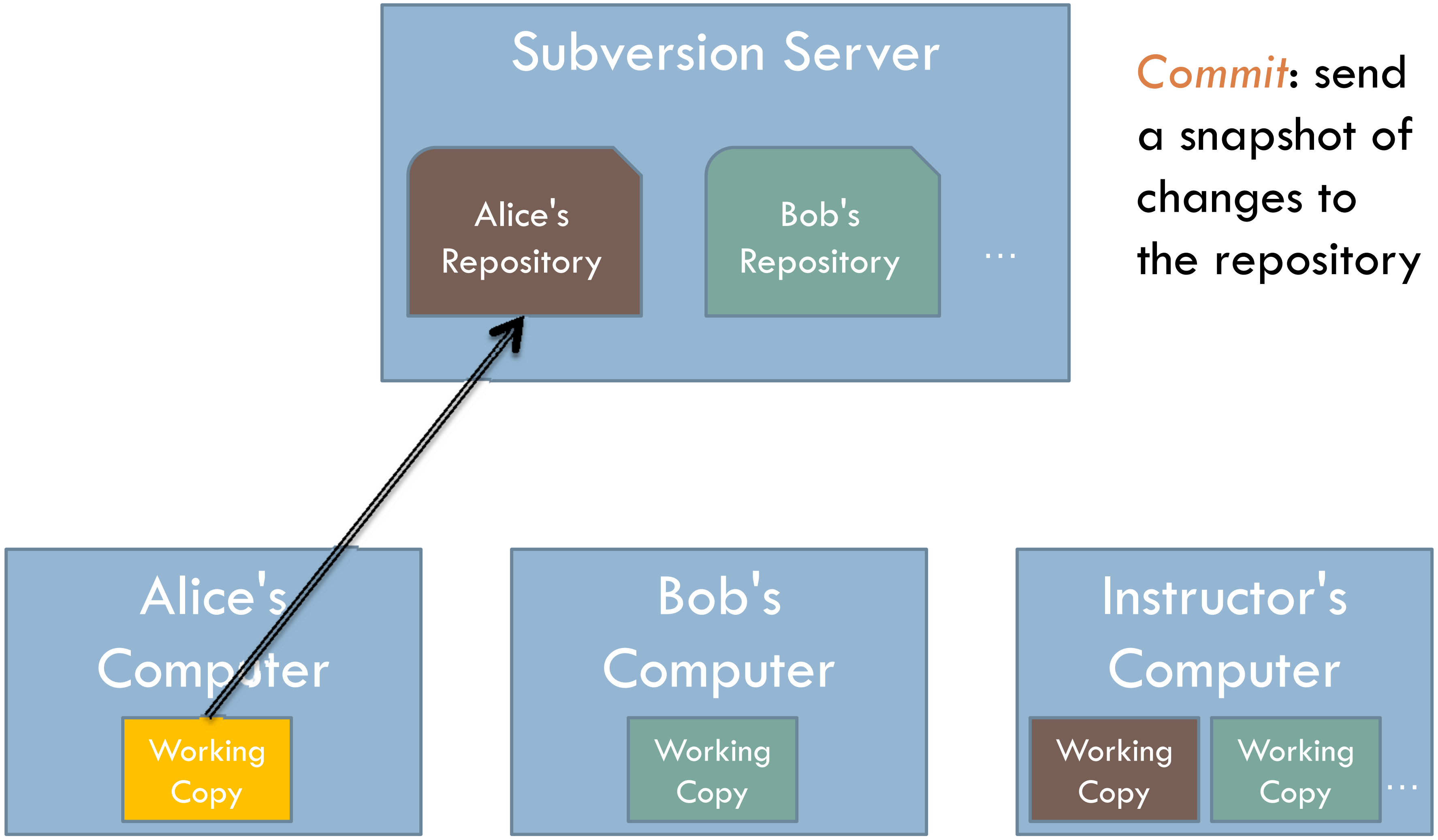
Check out: grab a new working copy from the repository

Version Control Steps—Edit



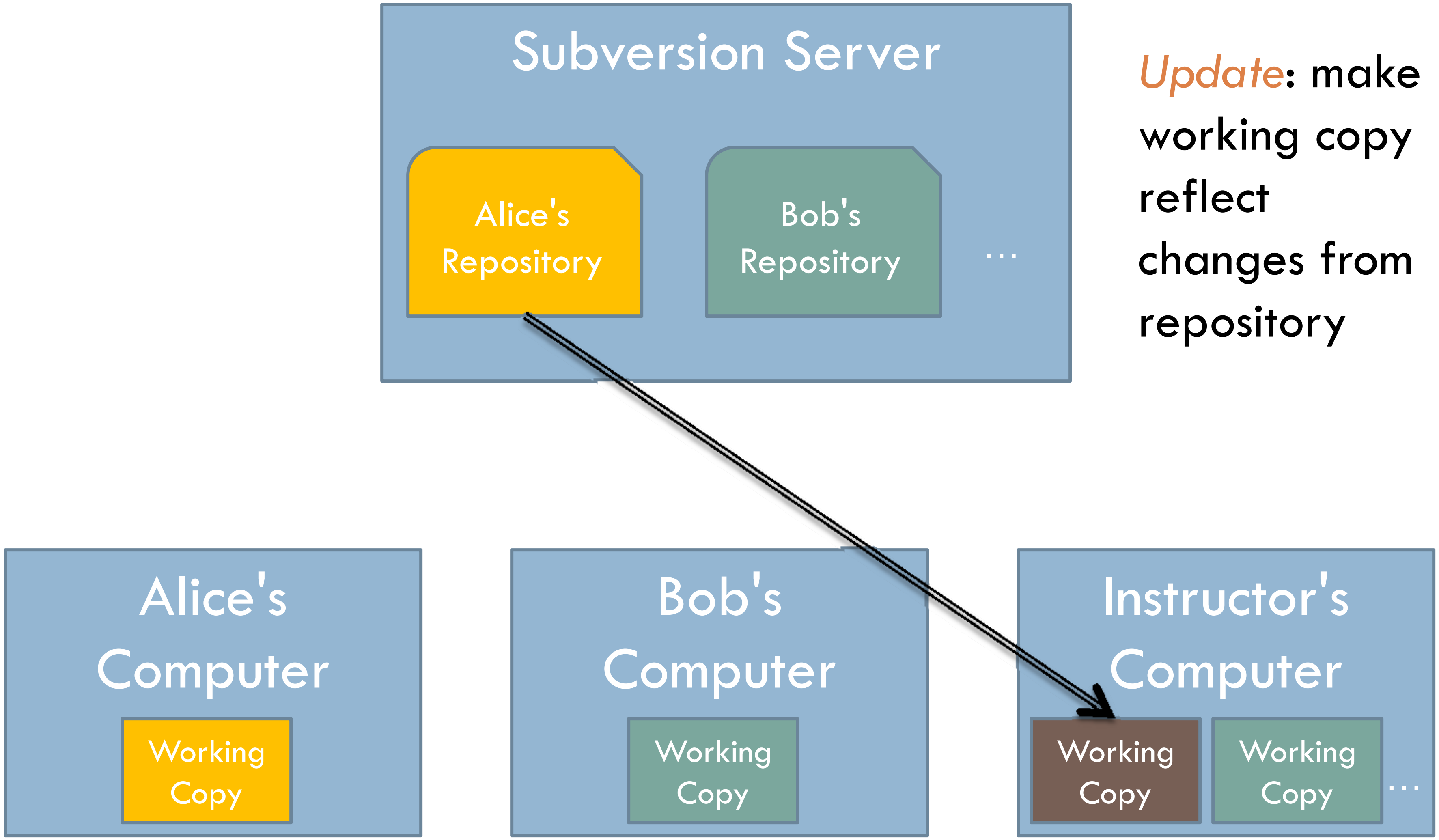
Edit: make ***independent*** changes to a working copy

Version Control Steps—Commit



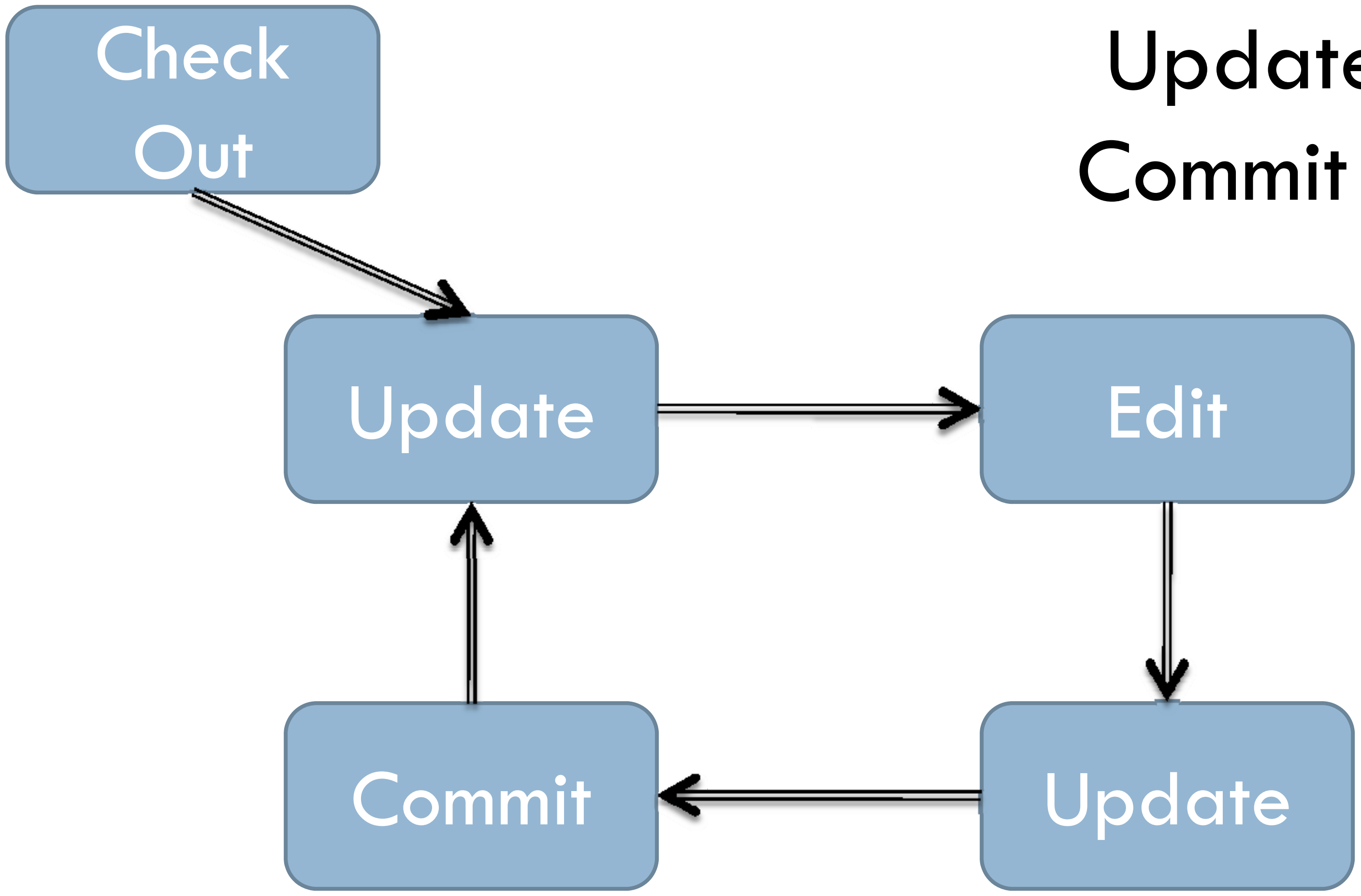
Commit: send a snapshot of changes to the repository

Version Control Steps—Update



Update: make working copy reflect changes from repository

The Version Control Cycle



Update and Commit often!

If you're stuck, get help and see http://www.rose-hulman.edu/class/csse/resources/Subclipse//installation.htm

Check out today's exercise

- Go to the SVN Repository view at the bottom or left of the workbench
  - If it is not there, Window→Show View→Other→SVN Repositories→OK
- Browse your SVN Repository view for Session08 project
- Right-click it, and choose Checkout
- Confirm all of the options presented
- In Package Explorer, find alienFace.py inside your Session08 project
- Add your name to the comments, then commit changes

The object of objects

- Data types for strings and numbers are passive
  - Each represents set of values
    - Passive
  - Each has set of operations
    - Active
- Most modern computer programs are built using Object-Oriented (OO) approach
  - An object is an active data type
    - Knows stuff
    - Can do stuff

The object of objects

- Basic Idea of OO development
  - View a complex system as interaction of simple objects
  - Example: the human body is a complex system

Q2

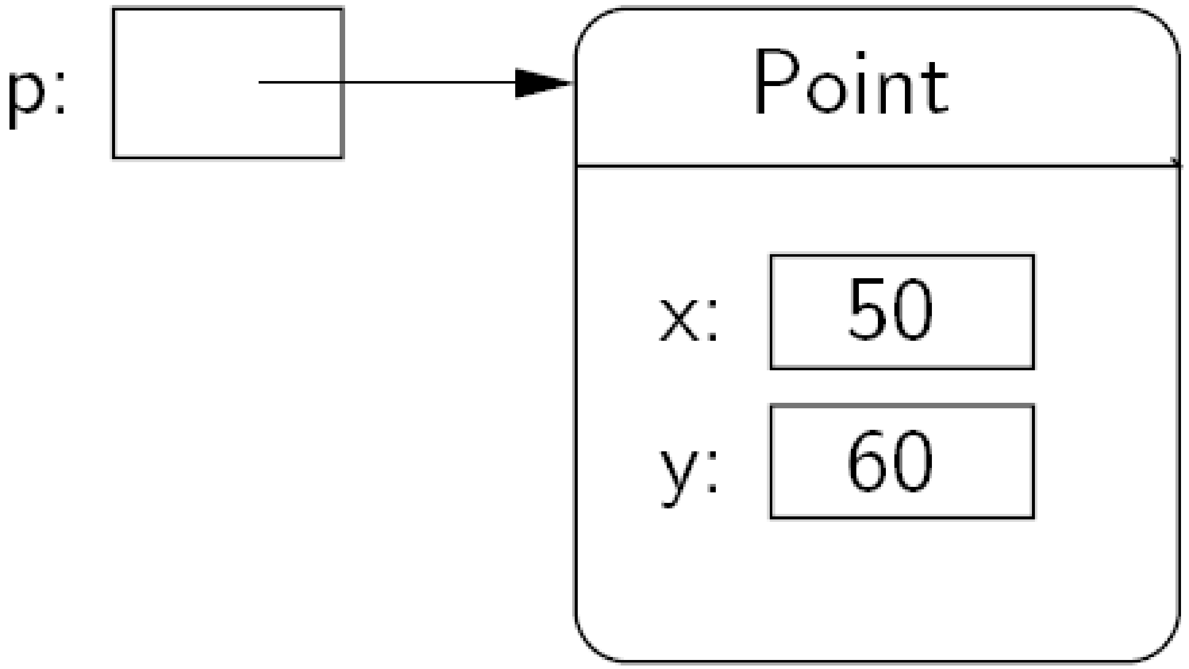
How do objects interact?

- Objects interact by sending each other messages
  - Message: request for object to perform one of its operations
  - Example: the brain can ask the feet to walk
  - In Python, messages happen *via* method calls.
- >>> win = GraphWin()   # constructor
- >>> p = Point(50, 60)   # constructor
- >>> p.getX()   # *accessor* method
- >>> p.getY()   # *accessor* method
- >>> p.draw(win)   # method

Q3

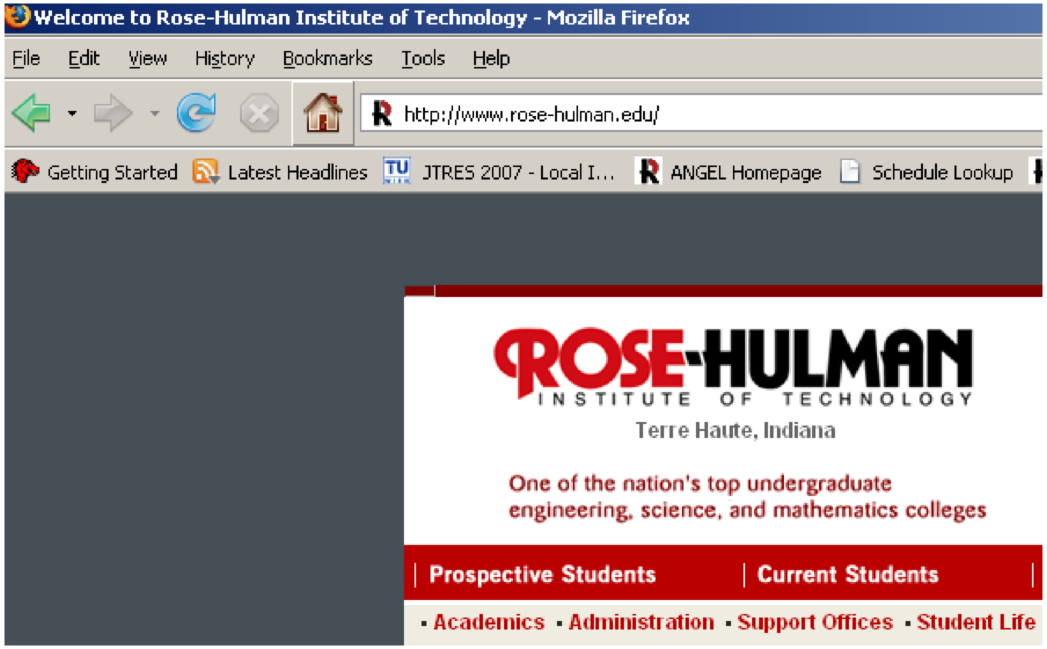
How do objects interact? Point

p = Point(50, 60)



Simple graphics programming

- Graphics is fun and provides a great vehicle for learning about objects
- Computer Graphics: study of graphics programming
- Graphical User Interface (GUI)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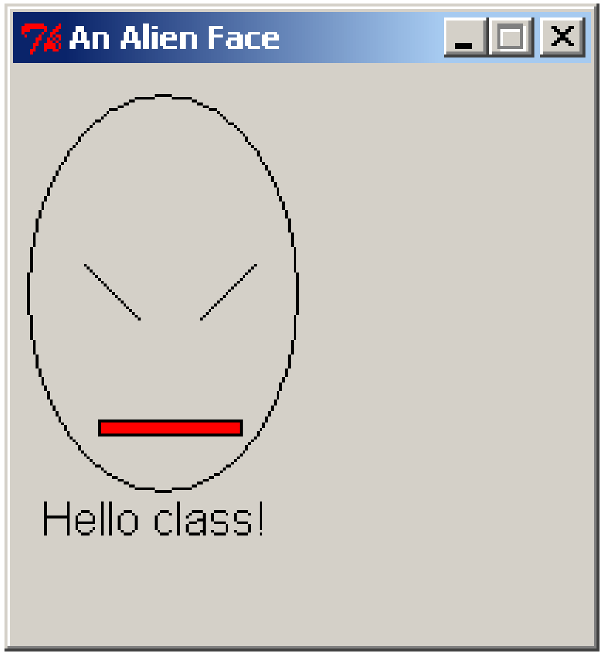
Q4

You choose how to import

- Must import graphics library before accessing it
  - `>>> import zellegraphics`
  - `>>> win = zellegraphics.GraphWin()`
- Another way to import graphics library
  - `>>> from zellegraphics import *`
  - `win = GraphWin()`

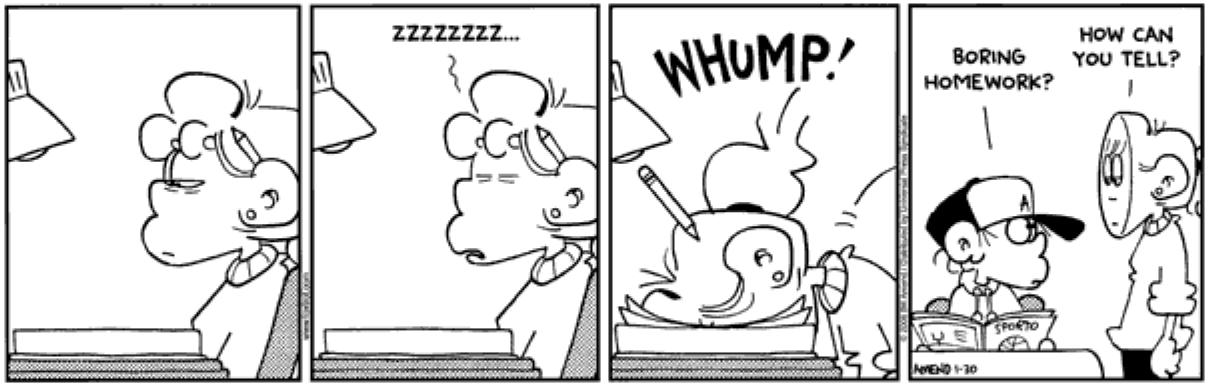
Using graphical objects

- Using different types of objects from the graphics library, draw the following alien face and message



Hello class!

Paige clearly isn't working on homework for CSSE120



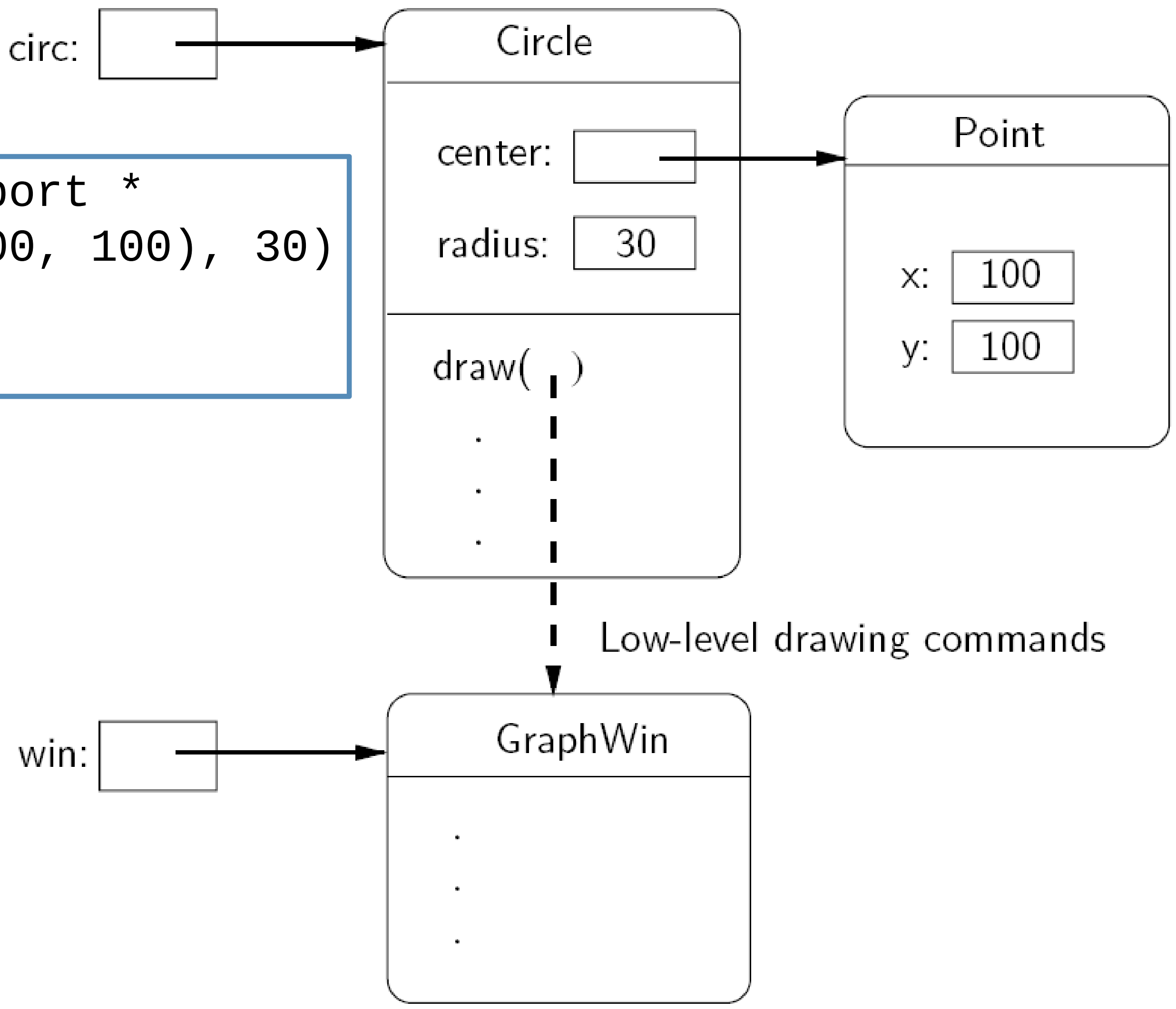
- Preview of tonight's homework:
  1. Read in and draw cool plots from the points in the files you generated in HW5 and 7
  2. Create a cool slideshow picture viewer!

Review: Class and object terminology

- Different types of objects
  - Point, Line, Rectangle, Oval, Text
  - These are examples of *classes*
- Different objects
  - head, leftEye, rightEye, mouth, message
  - Each is an *instance* of a class
  - Created using a *constructor*
  - Objects have *instance variables*
  - Objects use *methods* to operate on instance variables

Object interaction to draw a circle

```
from zellegraphics import *
circ = Circle(Point(100, 100), 30)
win = GraphWin()
circ.draw(win)
```



Interactive graphics

- *GUI*—Graphical User Interface
  - Accepts input
    - Keyboard, mouse clicks, menu, text box
  - Displays output
    - In graphical format
    - On-the-fly
- Developed using *Event-Driven Programming*
  - Program draws interface elements (*widgets*) and waits
  - Program responds when user does something

Q8

getMouse

- `win.getMouse()`
  - Causes the program to pause, waiting for the user to click with the mouse somewhere in the window
  - To find out where it was clicked, assign it to a variable:
    - `p = win.getMouse()`

Q9-10

Mouse Event Exercise

Together, lets' solve the following problem:

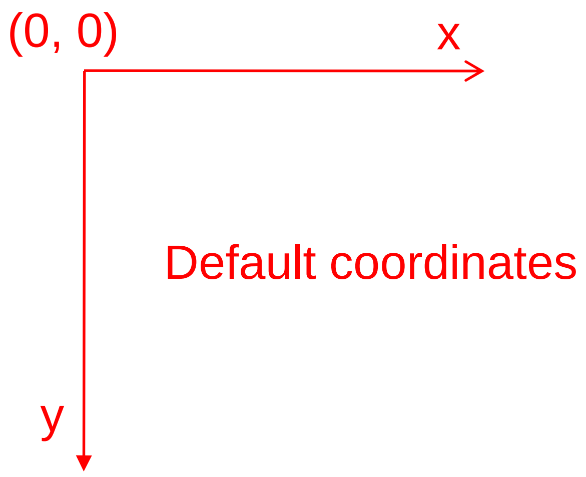
Create a program, `clickMe.py`, with a window labeled "Click Me!" that displays the message *You clicked (x, y)* the first 5 times the user clicks in the window.

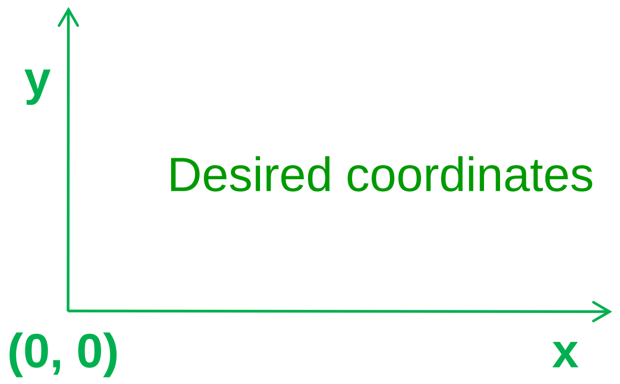
The program also draws a red-filled circle, with blue outline, in the location of each of these first 5 clicks.

The program closes the window on the 6th click

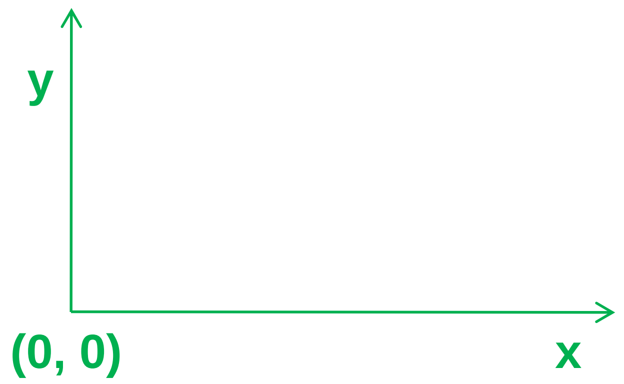
Coordinate systems

- An important use of graphics is to represent **data** visually
  - Example: a bar chart
- We really want (0,0) to be in the lower-left corner





Desired coordinate system



- `win.setCoords(x1, y1, x2, y2)` method from `GraphWin` class
  - Sets the coordinates of the window to run from (x1,y1) in the lower-left corner to (x2,y2) in the upper-right corner.