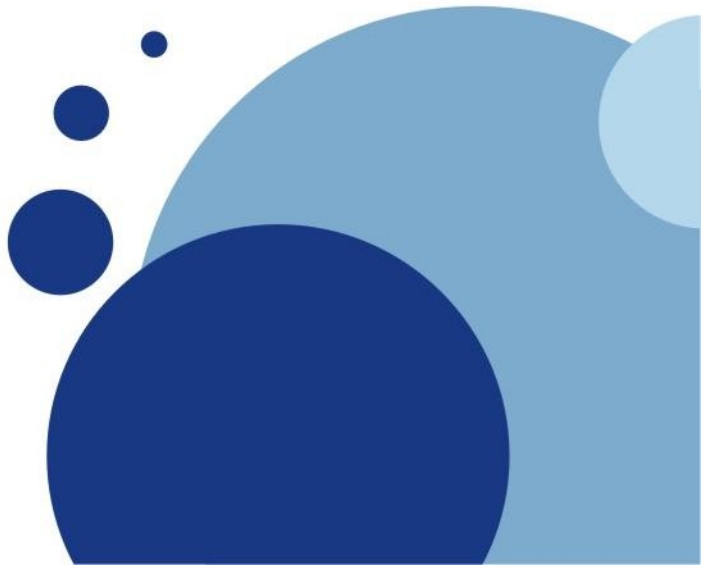
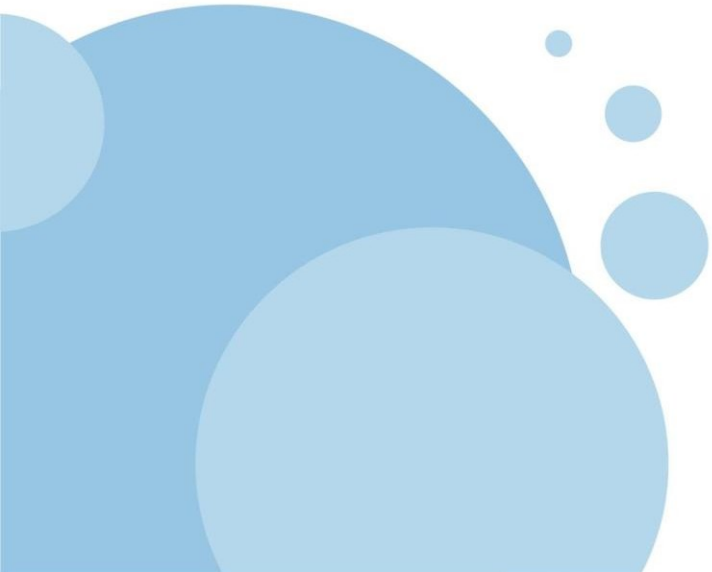
GEOG 178/258
Week 6:

UML, Poisson Distributions & Midterm Prep

mike johnson



PART 1: UML



Unified Modeling Language

Week 6

UML

UML is a **standardized** modeling language consisting of diagrams

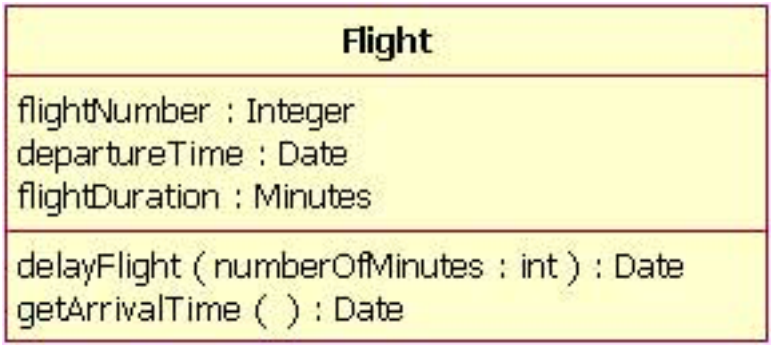
1. Developed to help system and software developers specify, visualize, document and construct software systems.

2. UML is another way of modeling an abstraction of reality

UML Class

Week 6

UML



Classes are represented as rectangles with stacked compartments:

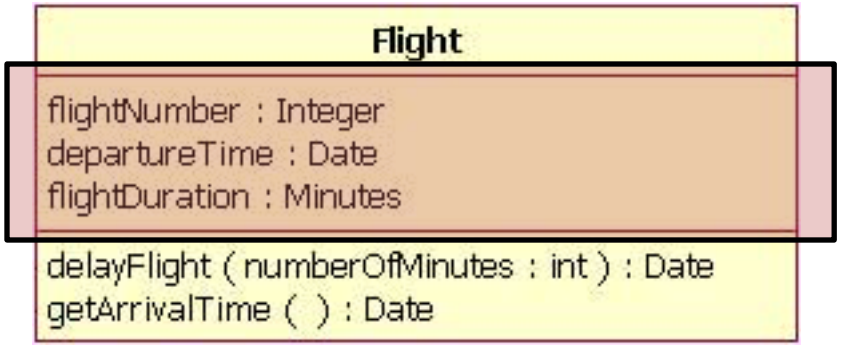
The top compartment shows the **class name** (Flight)
The middle: the **class attributes**
The last: the class operations (aka methods)

Think about how this already mirrors our structure of (**Attributes**, **Constructors**, Getters& Setters, **Methods**)

UML Class

Week 6

UML



Attribute lines are optional but if included are written in the following structure:

Name : attribute type

In many "everyday" class diagrams, the attribute types usually show units that make sense to readers (i.e., minutes, dollars, etc.). However, a class diagram that will be used to generate code needs classes whose attribute types are limited to the types provided by the programming language, or types included in the model that will also be implemented in the system.

Often default values will be provided as well:

MyBank: double = 0

UML Class

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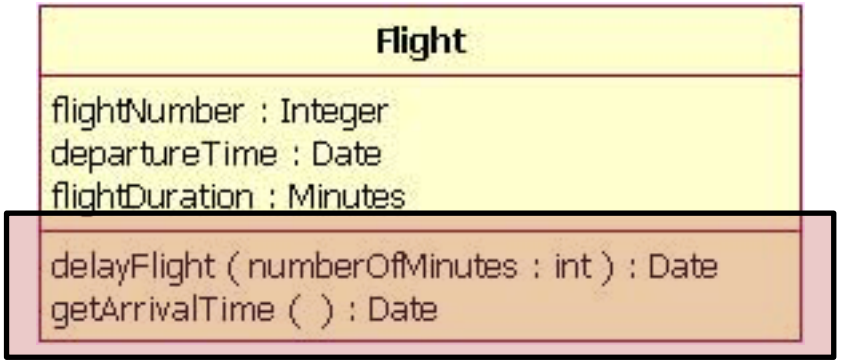
UML



Operations are documented is a list format in the following notation:

Name(parameter list) : type of value returned

(think to the signature of your methods like isInside!)

When parameters are needed the name and type should be explicitly provided:

isInside (P1 : Point, P2: Point) : Boolean

UML Class

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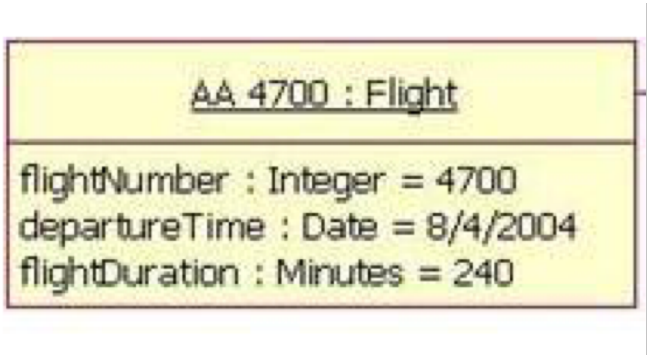
UML

In important (or specific cases) UML can be used to diagram a particular instance of a class



UML Inheritance

REVIEW: inheritance refers to the ability of one class (child class) to inherit the identical functionality of another class (super class), and then add new functionality of its own.

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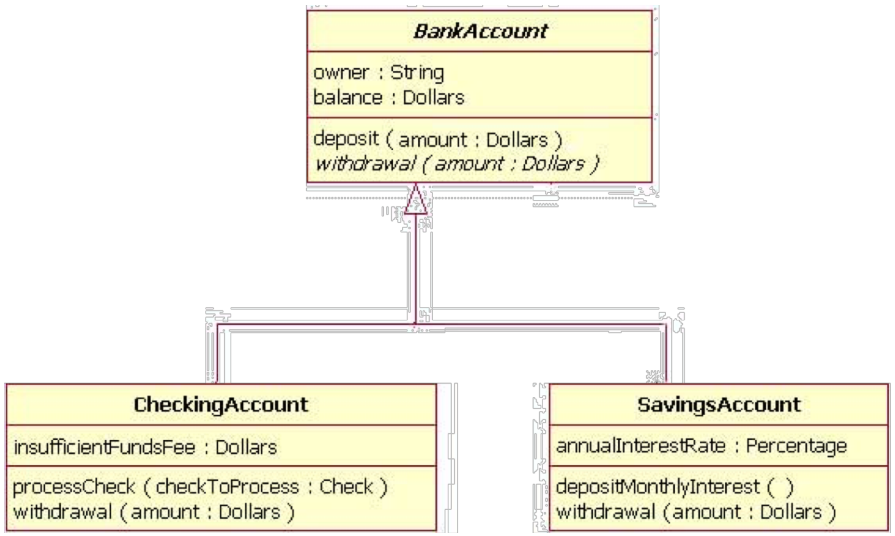
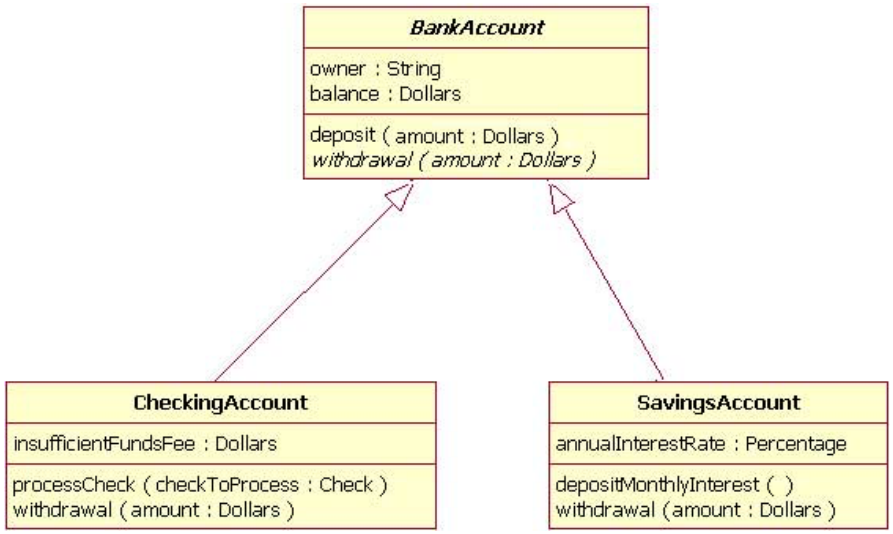
UML





Symbol Descriptions

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UML

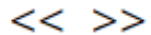
Generalization

Inheritance

Composition

Aggregation

Dependencies



Properties

Multiplicity

\+ For Public

\- For Private

\# For Protected

/ For Derived

~ For Package

For more look here

UML Class Generic Example

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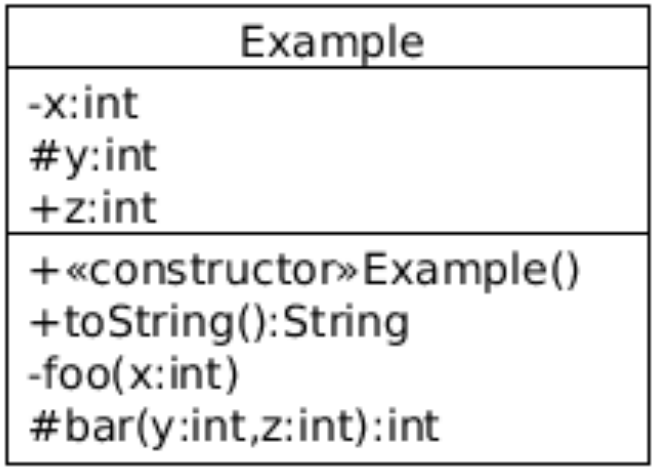
UML

```
public class Example {
        private int x;
        protected int y;
        public int z;

        public Example() { ... }

        public String toString() { ... }
        private void foo(int x) { ... }
        protected int bar(int y, int z) { ... }
}
```



OGC Point

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UML

Private variables

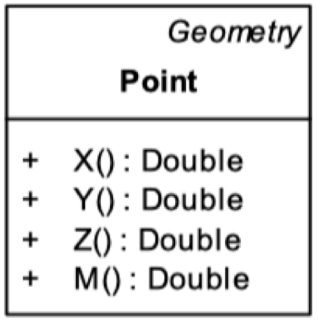

Figure 4: Point

6.1.4.2 Methods

— **X** ( ):Double — The *x*-coordinate value for *this* Point.

— **Y** ( ):Double — The *y*-coordinate value for *this* Point.

— **Z** ( ):Double — The *z*-coordinate value for *this* Point, if it has one. Returns NIL otherwise.

— **M** ( ):Double — The *m*-coordinate value for *this* Point, if it has one. Returns NIL otherwise.

OGC

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UML

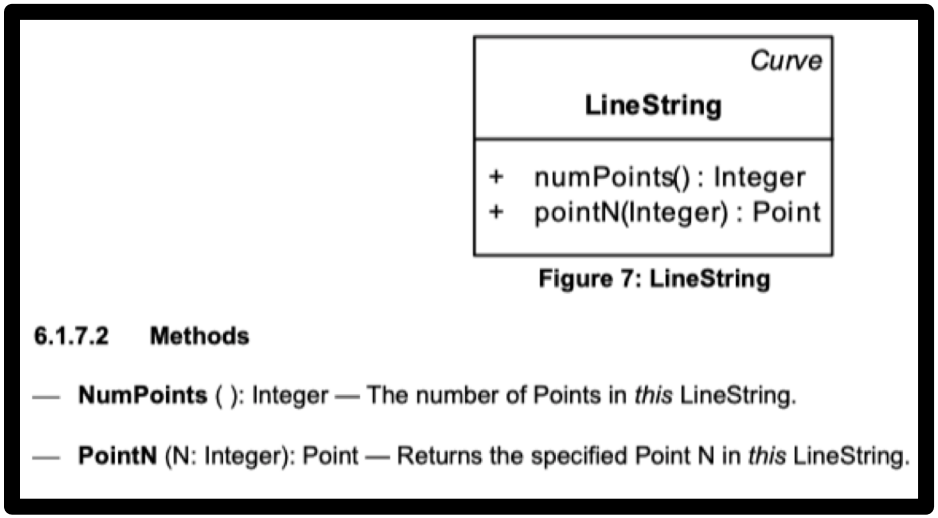

Figure 7: LineString

6.1.7.2 Methods

— **NumPoints** ( ): Integer — The number of Points in *this* LineString.

— **PointN** (N: Integer): Point — Returns the specified Point N in *this* LineString.

OGC Polygon

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UML

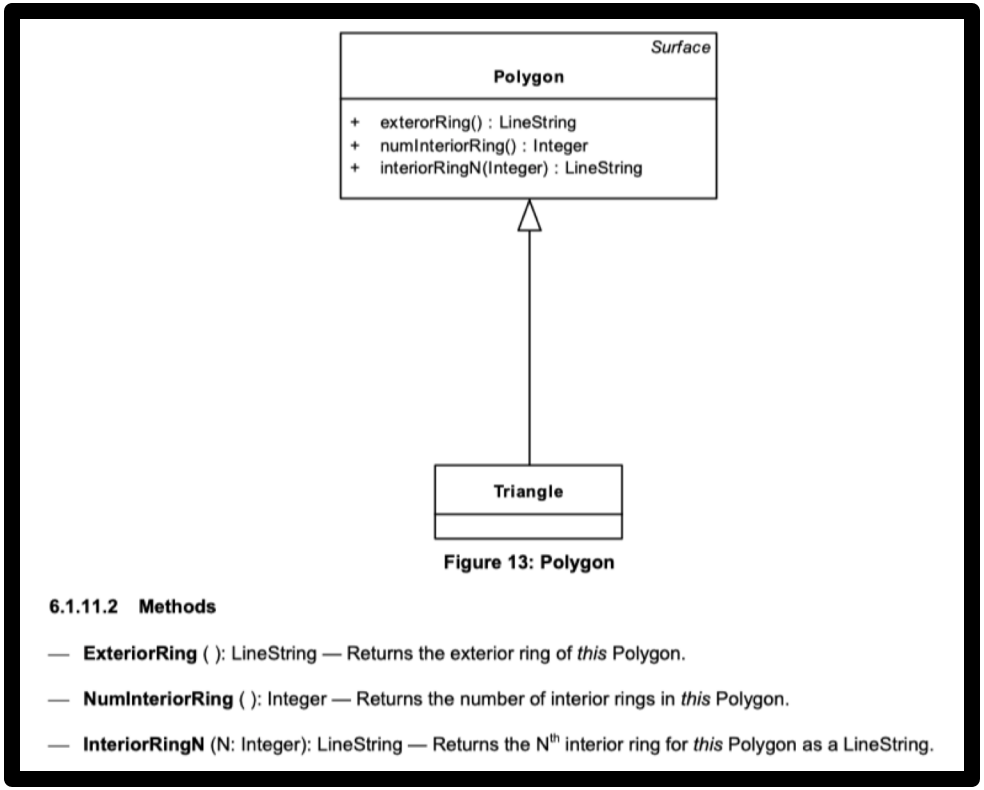

Figure 13: Polygon

6.1.11.2 Methods

— **ExteriorRing** ( ): LineString — Returns the exterior ring of *this* Polygon.

— **NumInteriorRing** ( ): Integer — Returns the number of interior rings in *this* Polygon.

— **InteriorRingN** (N: Integer): LineString — Returns the N^{th} interior ring for *this* Polygon as a LineString.

OGC. PolyhedralSurface

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UML

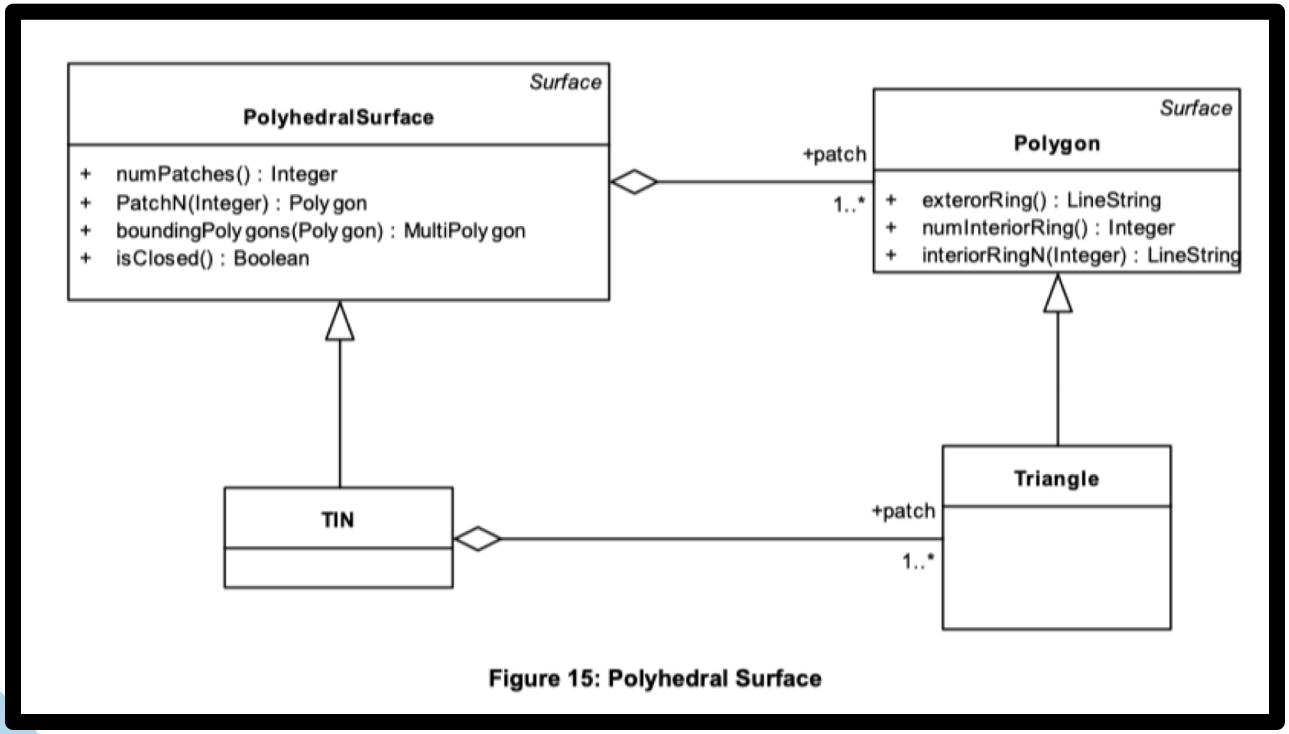

Figure 15: Polyhedral Surface

OGC Simple Features

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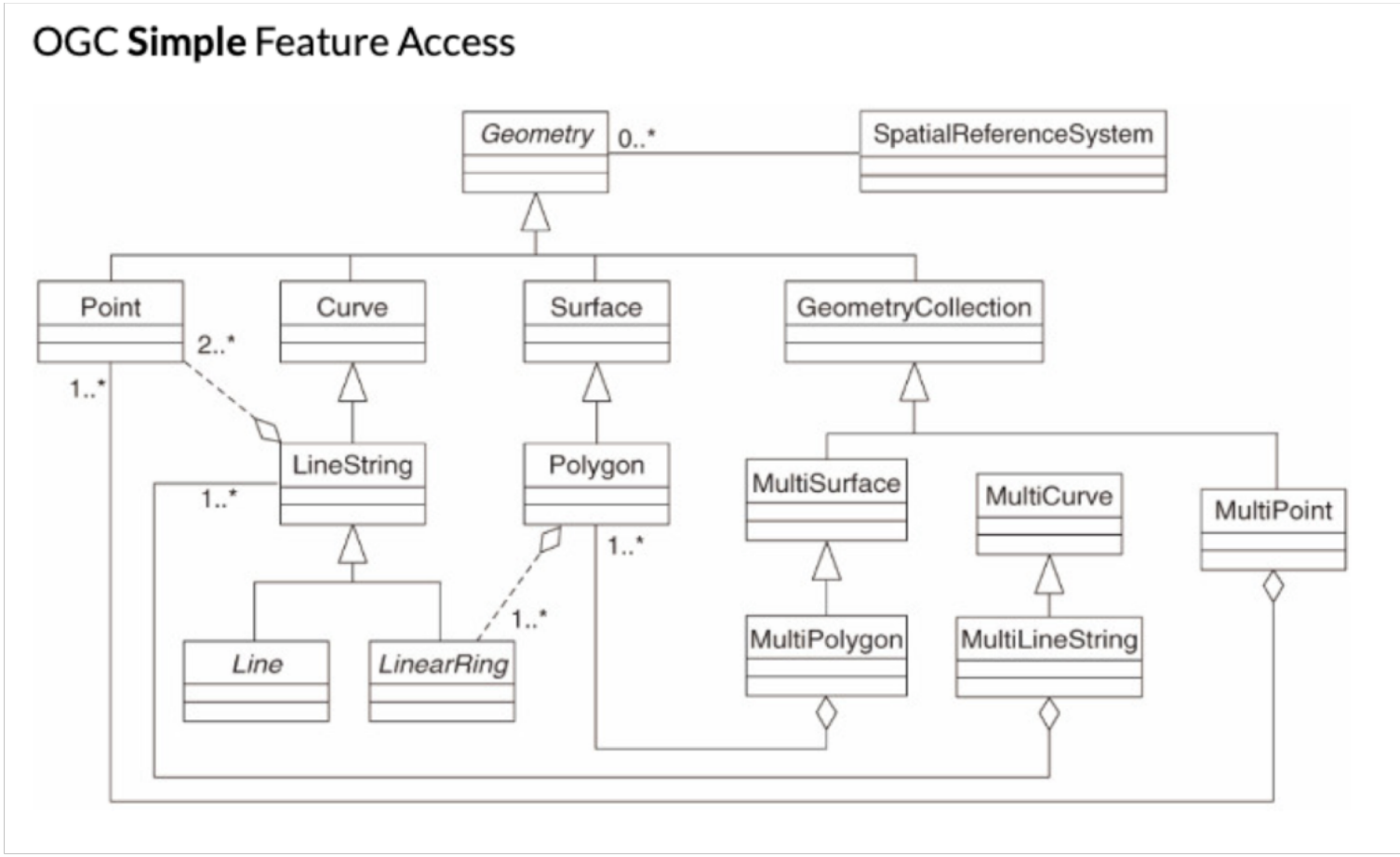
UML



Real Life UML Data Modeling

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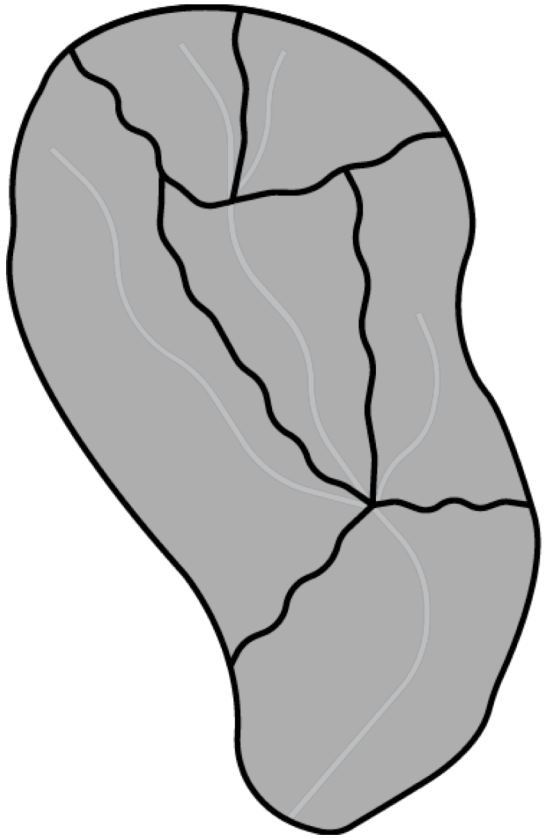
UML

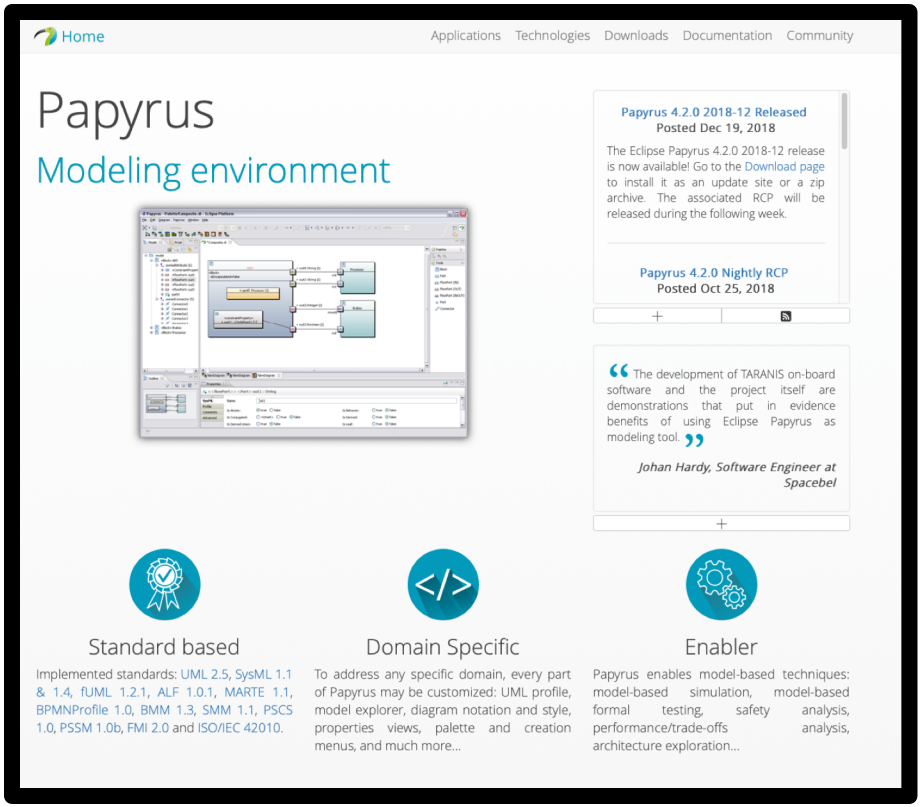
WaterML (click me)



UML in Eclipse

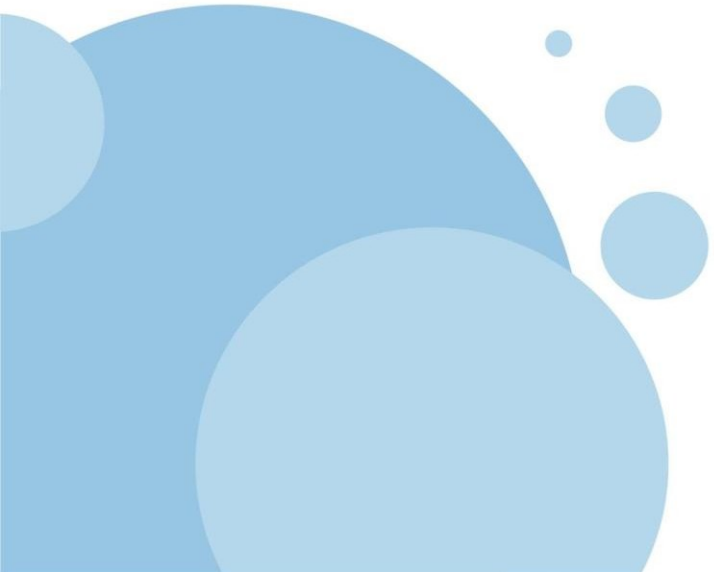
Week 6

UML



https://www.eclipse.org/papyrus/

PART 2: Poisson Distributions



Poisson Distribution

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Poisson

The Poisson Distribution is a **discrete** probability distribution that expresses the **probability** that a given number of events, occurring in a **fixed interval** of time or space with a **known constant rate** and **independently of the time since the last event.**

$$P = \frac{average^{i}}{i! \times e^{average}}$$

Story

Week 6

Poisson

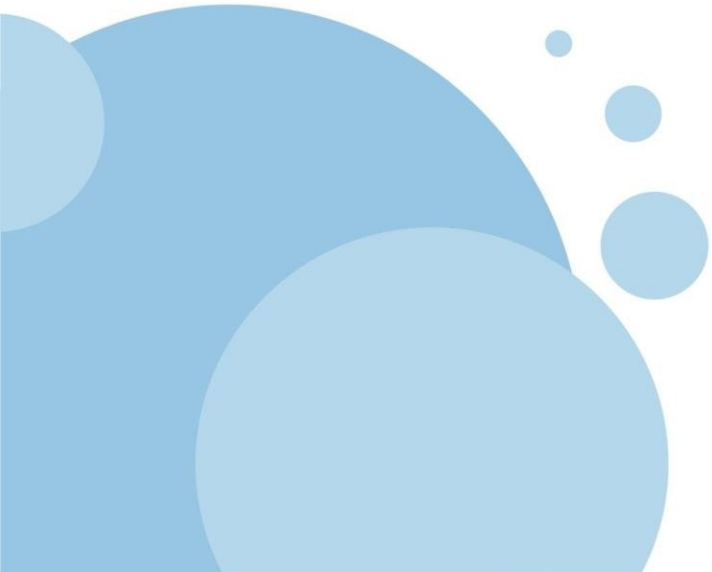
Number of Campers	Number of Plots
1	278
2	92
3	25
4	4
5	0
6	0
7	1

Our goal:

1. What is the Poisson Distribution of these campers ?
2. Can campers/plots able to be described by such a discrete distribution?

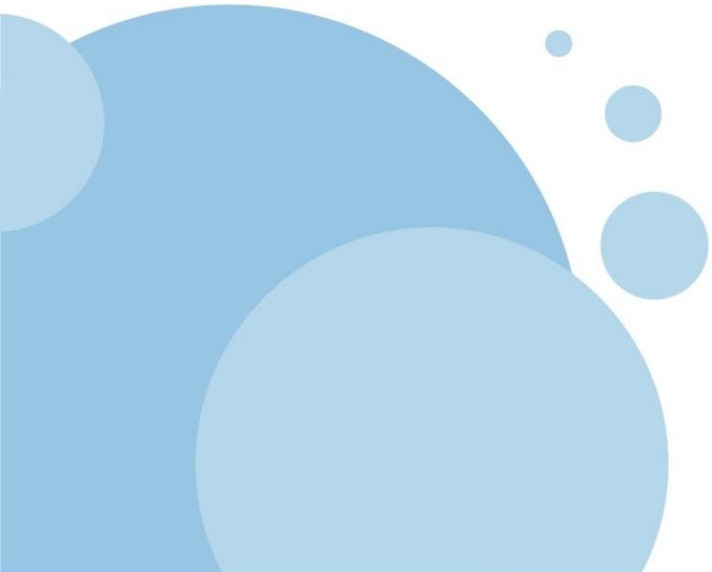
EXAMPLE # 1

Campers, Plots and Poisson



EXAMPLE # 2

Getting Poisson to Github



Version Control

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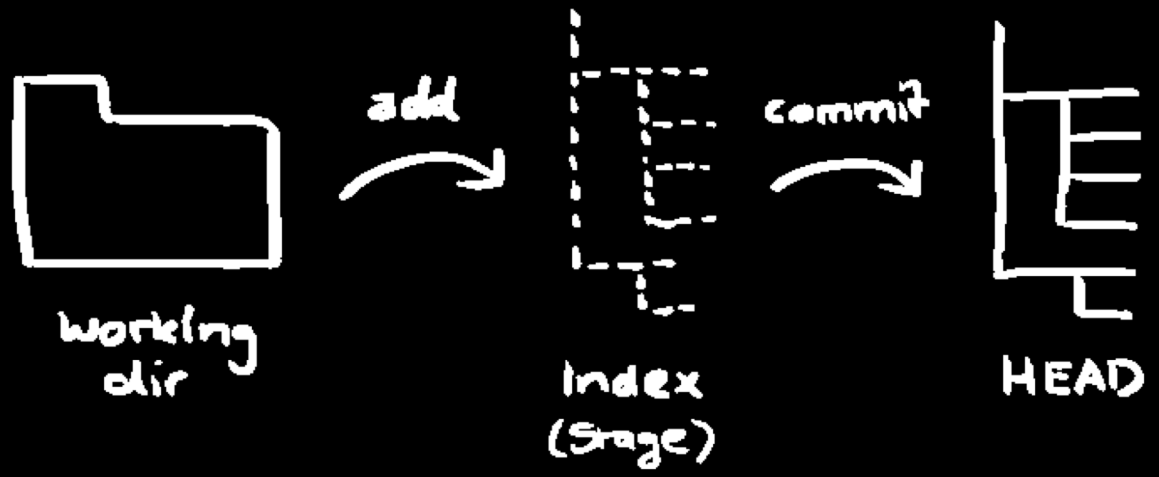
Github



Github Workflows

Week 6

Cheat sheet

Create a new git repository: *git init*

Checkout an existing Repo: *git clone <path>*
Connecting to remote repo: *git remote add origin <server path>*

Adding files: *git add <filename>*
Adding all files: *git add **

Committing to HEAD: *git commit –m message*

Pull files: *git pull origin master* *master can be subbed for any branch
Pull files and realign: *git pull –rebase*

Push files: *git push origin master* *master can be subbed for any branch

Branching

Week 6

Github

Branching Workflow

Week 6

Cheat sheet

Create a new branch called “new_feature”:
git checkout –b new_feature

Switch back to master:
git checkout master

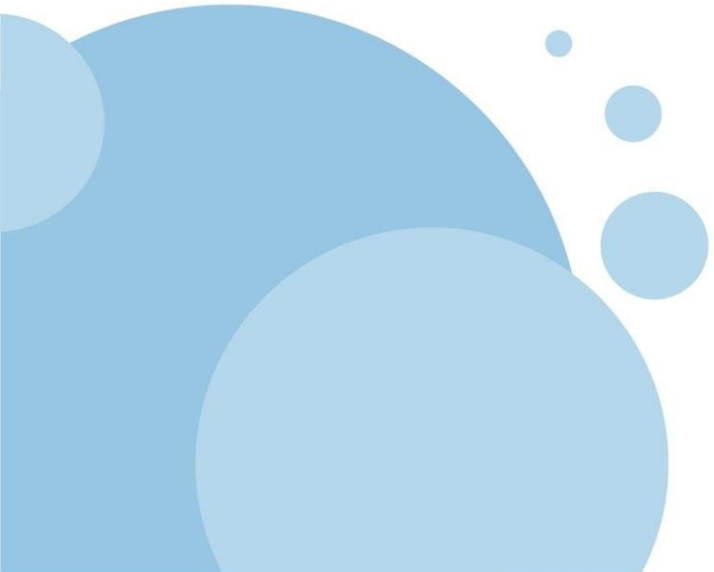
Switch back to branch
git checkout new_feature

Combine branches (from master)
git checkout master *be sure your in master
git merge new_feature

** Sometimes conflicts will occur between branches that make merging impossible. You have to fix these manually and add them back in via git add <file>

*** If you really mess up a file you can get the original back:
git checkout <filename>

PART 3: HW and MT Hints



Homework Hints!

Week 6

Homework Hints

Interfaces

Geometry {getLength, getArea}
BoundingArea {isInside}[G]
Polypoints{getPoints, setPoints, getPointCount} [G]

Needed Classes:

BoundingBox (BA)
Circle (G)
Point (G)
PointBuffer (BA)
Polygon (PP)
Polyline (PP)
Rectangle (G)
Square (G)
Test (NA)

() implements
[] extends

Midterm Examples

Week 6

MT

Check out the class site for an example set of MT questions