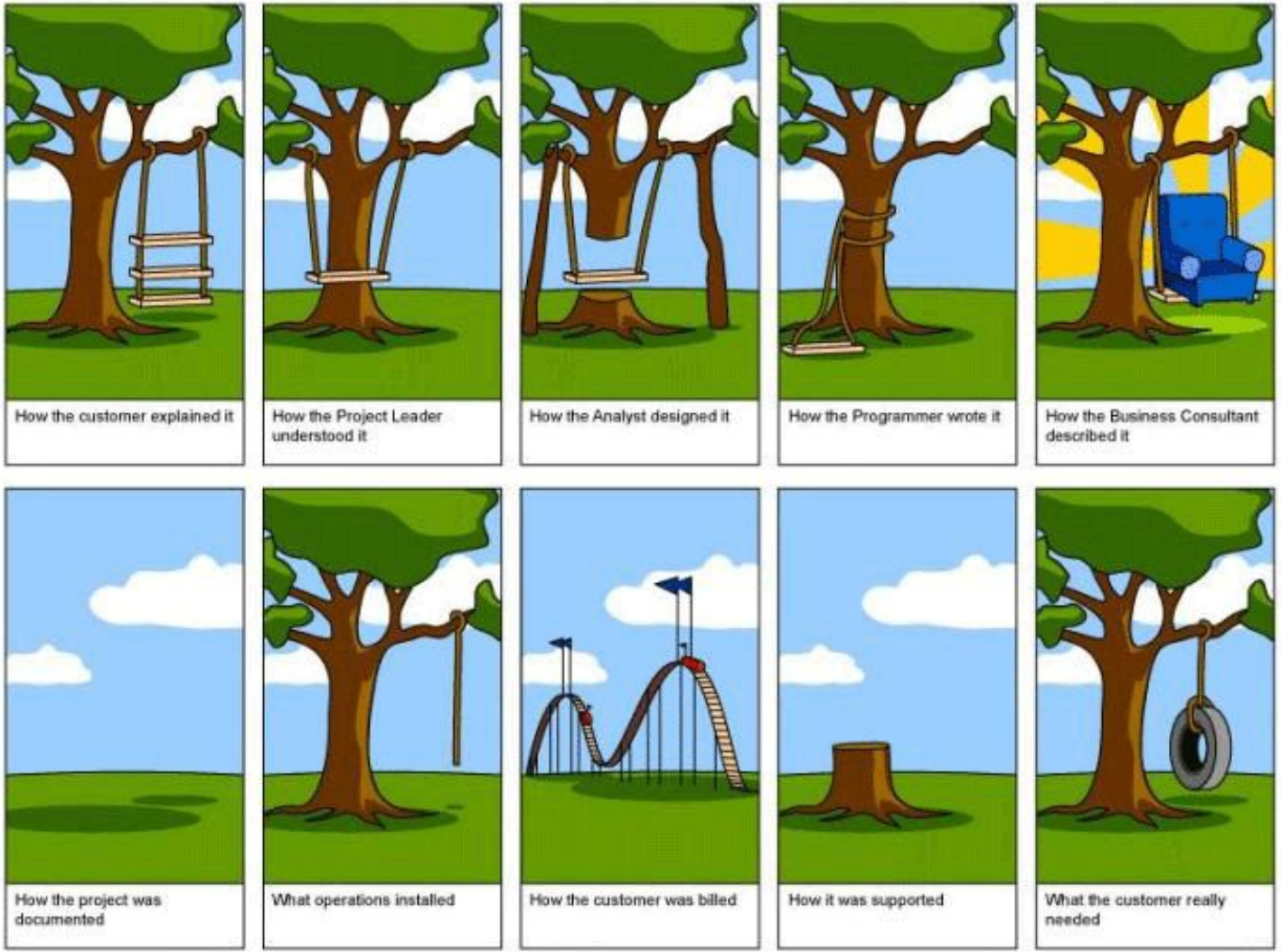
CSC301

Product management in an Agile environment

Project vs. Product

Project Management	Product Management
How to organize your team?	What should the team build?
Delegating tasks, time estimation, scheduling, tracking performance, etc.	Scoping, prioritizing, collecting and analyzing feedback, etc.
Requires understanding of your team members, their abilities and working habits.	Requires understanding of your users and their needs.
Requires organizational skills	Requires domain expertise.

Lack of project and/or product management leads to jokes like this one ➜



Agile Product Management

- Agile approach:
  - Iterative, ongoing process
  - Work in short cycles to allow frequent delivery
  - Between iterations/cycles, review your work and adjust the plan (if necessary)
  - Focus on the user!

Agile Product Management

- Each iteration involves roughly the following steps:
  - Planning
    - Articulate goals and success metrics
    - Make some decisions
  - Doing work
    - E.g.: build (and test) software, perform market research, etc.
  - Reviewing outcomes
    - Collect feedback and evaluate decisions in retrospect

Example 1

- Planning:
  - Goal: Get visitors to our promotion page.
  - Metric: Number of visitors who see the promotion / Total number of visitors to the site
  - Decision: Add a big, red button at top-right corner of the home page
    - Multiple decisions are usually considered - e.g., see A/B testing below
- Work:
  - Add the button
  - Make sure we can track which pages are visited by each visitor
  - Optional: Allow for A/B testing (i.e., some users see the a different button, or see none at all)
- Review:
  - Check the percentage of users who saw the promotion
  - Are we doing better than we did last week?
  - If we did A/B testing, is there correlation between the button we put on the screen and likelihood that a user will visit the promotion page?

Example 2

Consider a hypothetical automated assignment-submission system at a university (e.g. MarkUs, Blackboard, the tools we use in this course, etc.)

- Planning
  - Goal: Minimize the need for human intervention
  - Metric: Percentage of assignments that require human intervention
  - Decision: When a student submits an assignment, validate the file names and present a friendly message in case of an error

Example 2, Cont’d

- Work:
  - Option 1 - Build the feature
    - Instructor can specify which files/folders are required
    - If a submission is missing a required file, reject it and show a friendly error message
  - Option 2 - Try to *validate the hypothesis**, without building anything
    - Collect data from past courses
    - Out of those assignments that required human intervention, how many had an issue with missing required files?

** In this case, the hypothesis is that submissions with invalid file names cause the need for human intervention.*

Example 2, Cont’d

- Review:
  - Option 1 - Count how many invalid submissions were detected
  - Option 2 - Estimate how many submissions such a feature will detect (which will allow you to decide whether it is worth the cost/effort of implementation)

Notice that, in both cases, collecting data might be tricky:

1. “Running experiments” is not so easy
2. Historical data is usually not tracked

Pragmatic Product Management

- Use intuition/experience/etc. to come up with ideas
- Use a scientific method to validate ideas:
  - Instrument (i.e., set things up), experiment, measure & conclude
- Use **tools** to collect and analyze feedback
  - Various analytics tools
  - Product management tools
  - Custom, in-house tools
- Gradually, it should become easier to ask (the right) quantitative questions
  - And get statistically significant answers

Pragmatic Product Management

- Many companies are already using data scientists to help with product decisions
  - Mostly in helping evaluate ideas, see which work and which don't
  - Cohort analysis is frequently used
    - Users are split into cohorts with some shared characteristic (e.g., the day of the week they signed up, whether they're using a desktop or a mobile version of the product, etc.)
    - Their engagement with the product and/or other behaviour is evaluated
  - Not many startups can afford data scientists
- Keys for data-driven product management:
  - Thorough instrumentation
  - Modularity (to easily modify the product to test ideas)
  - Continuous experimentation

Product Management

- Once you have a product and active users, it’s easier to articulate goals:
  - User actions and feedback drive decisions
  - Business goals drive decisions
  - Easier for all team members to understand the overall vision
- But, at the beginning, things are much less clear and structured ...

Product Definition

- How do we get from an initial idea to a working product (or even a prototype)? **Incrementally**!
- Start with high-level concepts, and **gradually** create more detailed plans
  - Goals
  - Requirements
  - Design
- It is not always clear where one stage ends and the next one begins
  - We will try to clarify that by reviewing some of the tools, techniques, and standards that we use along the way

Step 1 - Goals

- High-level, concise English description - **use customer language**!
  - Ignore most technical details
- Focus on:
  - What is the **objective** of your product?
  - Who are your **users**?
  - Why would they use the product? That is, what **value** will your product offer to its users?
- The focus is the problem and users, not the product
  - Problem domain, not solution domain
- Plan first, don't build it just because you can!
- Borrow techniques from the marketing world ...

Objectives

- Articulating objectives can change the priorities and even the nature of your product
- For example, here are different objectives for a “TTC app”:
  - Provide ETA of next vehicle(s) to nearby station(s).
    - Accuracy of vehicle data is a high priority
  - Help tourists and visitors explore the city and its attractions using the TTC.
    - Internationalization is a high priority
    - A good database of attractions & events is a high priority
  - Help commuters plan trips that combine driving and TTC
    - Accurate traffic reports are a high priority
    - Parking (at TTC stations) information might be a high priority as well
  - Help TTC employees plan schedules/routes.
    - Collecting and visualizing data can be very useful

***Notice**: We only talk about the problem we want to solve. We don’t say what the product is, and we definitely don’t mention any technical details at this point.*

Personas

- A tool/technique used for identifying users/customers
- Popularized by marketers
- Goals:
  - Identify and understand our users
  - Remember the details of our “user profiles”
  - Efficiently discuss our archetypal users (by using names, instead of full descriptions).
- The idea is simple:
  - Develop a character (name, picture, background story, etc.)
  - The character represents an archetypal user
  - A named character is much easier to remember (and to use in a conversation - i.e., to communicate) than a list of characteristics and attributes

Personas

- Here a few examples:
  - Dan The Commuter (student)
  - Suburban (Family man) Joe
  - Shirley & Mike (retired culture vultures)
- And more online resources:
  - A nice video tutorial on developing personas
  - An article about the origin of personas
  - And another nice blog post

Step 2 - Requirements

- What is needed in order to achieve our goals?
  - High-level description of the main concepts of our system and the interaction between them
- Artifacts can be
  - Structured English documents
    - For example: User stories, Use case descriptions
  - Diagrams
    - For example: UML use case diagrams

User Stories

- A tool/technique used for specifying high-level requirements.
  - Specified from the user's perspective, use everyday language
  - Captures WHO, WHAT, and WHY
  - Follow a pattern: **As *<role>*, I want *<action/desire>*, so that *<benefit>***

- For example:
  - As an **instructor**, I want to **specify which files/folders are required** for a given assignment, so that **students know what they need to submit**.
  - As a **student**, I want to see a **clear error message if something is wrong** with my submission, so that I can **fix it and not lose marks**.

More User Story Examples

- Good:
  - User Story #57: As a **Shopper**, I would like to **have a receipt for my purchase**.

- Is this a good user story? How do you improve it?

More User Story Examples

- Good:
  - User Story #57: As a **Shopper**, I would like to **have a receipt for my purchase**.
- Better - use Personas, add details, and describe the benefits:
  - User Story #57:
    - As **Sam (a budget shopper)**, I would like to **have a receipt for my purchase** that *lists the price and any discounts*, so that **I have a record of my purchases**.
    - The receipt should also have a date and be laid out nicely – see attached example.

User Story Refinement

- Good
  - User Story #60: As a **Retailer**, I want to **offer items on sale for a reduced price for a limited time**, so that **I can increase traffic in the store**.
  - The price reductions in this User Story can be a percentage reduction or a straight reduction to a lower price.
- Better
  - User Story #60a: As **Kate (a store manager)**, I want to **offer a flat rate discount on items**, so that ...
  - User Story #60b: As **Kate (a store manager)**, I want to **offer a percentage discount to senior citizens on Tuesdays**, so that ...
  - User Story #60c: As **Kate (a store manager)**, I want to **log which discounts are used on which days of the week**, so that ...

Acceptance Criteria

- Acceptance Criteria
  - Provide the definition of “done” for the user story - when it’s completed and working as intended
  - Define the scope of a user story
  - Help the team to get a shared understanding of a user story (reduce ambiguity!)
  - Help derive tests for a story
- Writing acceptance criteria
  - Focus on the problem, not the solution - what’s the intent behind the user story?
  - Implementation-independent
  - Quite high-level
- The Given-When-Then template is frequently used
  - (**Given**) some context – precondition
  - (**When**) some action is carried out – what is to be tested
  - (**Then**) a particular set of observable consequences should obtain – expected outcome

Acceptance Criteria Examples

- Example user story:
  - As an **internet banking customer** I want to **see a rolling balance for my everyday accounts** so that I **know the balance of my account after each transaction is applied**.
- Example acceptance criteria:
  - The rolling balance is displayed
  - The rolling balance is calculated for each transaction
  - The balance is displayed for every transaction for the full period of time transactions are available
- Another Example - **Given-When-Then** template:
  - **Given** my bank account is in credit, and I made no withdrawals recently, **When** I attempt to withdraw an amount less than my card's limit, **Then** the withdrawal should complete without errors or warnings.

Use Cases

- Another convention/standard for specifying requirements
  - Focus more on the scenarios of interaction between users and the system
  - Use case = collection of scenarios
  - Scenarios are **purposeful** - i.e., a user has a certain goal and scenarios show how it can be achieved
- More verbose and detailed compared to user stories
  - Unique identifier, name, description, involved actors, their interests
  - Pre & post conditions
  - **Basic**, **alternative**, and **exceptional** courses of action
- Serve similar purpose as user stories, but they are not the same
- Here is yet another nice example of a hypothetical use case versus user story
  - User stories are about needs, use cases are about the complete behaviour of your program
  - User stories are easy to read (for non-technical people as well), use cases are “a recipe” for technical team members (who need to implement the use case)

Use Case Description Example

Use Case Title: Buying a PVF Product at WebStore
Primary Actor: Customer
Level: Kite (summary)
Stakeholders: Customer, shipping clerk
Precondition: Customer accesses the WebStore website
Minimal Guarantee: Rollback of any uncompleted transaction
Success Guarantees: Order filled
Trigger: Customer accesses WebStore homepage
Main Success Scenario: 1. Customer browses catalog. 2. Customer places order for desired product(s). 3. Shipping clerk fills order. 4. Customer checks status of order.
Extensions: 1a. Catalog is not available. 1a1. Customer quits site. 1a2. Customer takes action to gain access to catalog. 2a. Order transaction is interrupted. 2a1. Transaction rolled back. Customer starts again. 2a2. Transaction rolled back. Customer quits site. 3a. Item is out of stock. 3a1. Shipping clerk notifies customer. Customer waits for stock to be replenished. 3a2. Shipping clerk notifies customer. Customer cancels order. 4a. Order status is not available. 4a1. Customer quits site. 4a2. Customer takes action to gain access to order status.

[[Hoffer et al., 2014, Fig. 7-34]

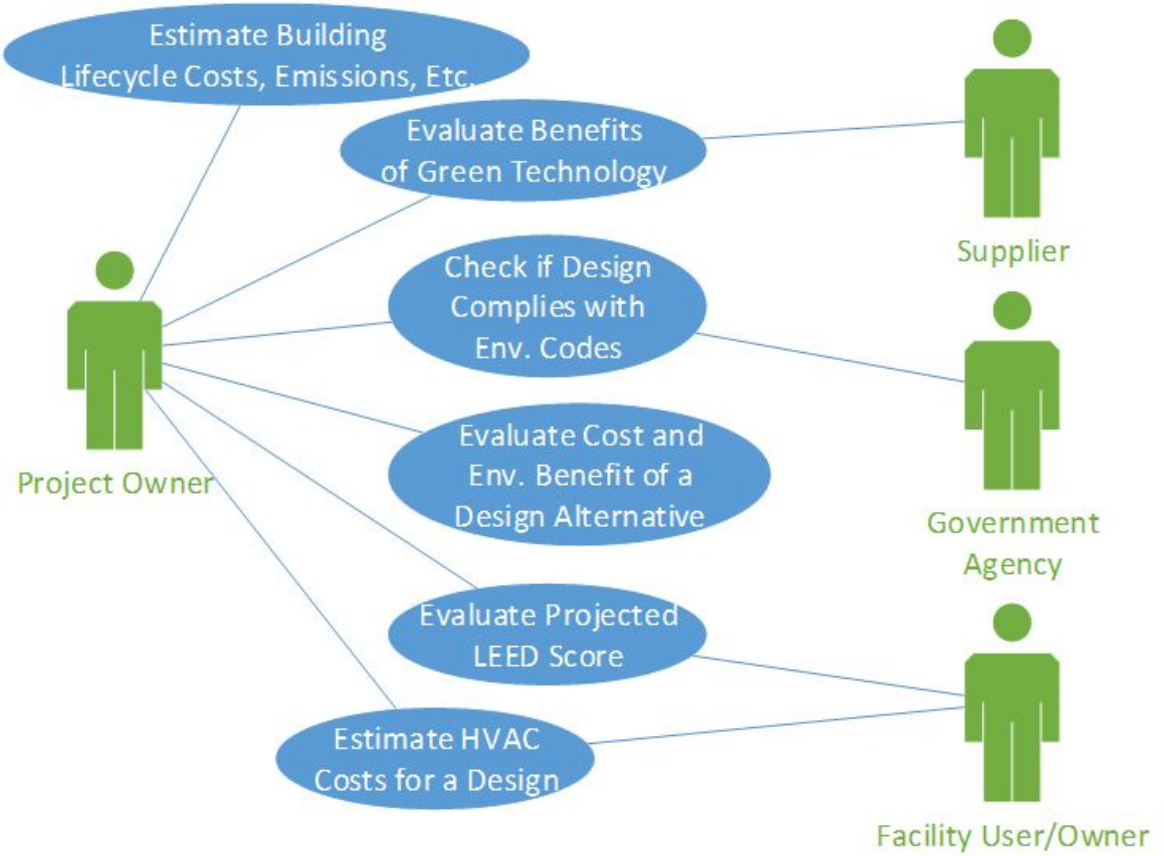
Use Case Diagrams

- Use case diagrams are part of the the UML standard
- Visually depict the connections between various related use cases and between use cases and related actors
  - Which user(s) participate in which use cases?
  - Which external/internal application(s) participate in a certain use case?
- Optionally, organize further using system boundary boxes and/or packages.
- Include relationship - states that one UC is executed as part of another
- Extend relationship - states that one UC specifies optional behaviour for another UC

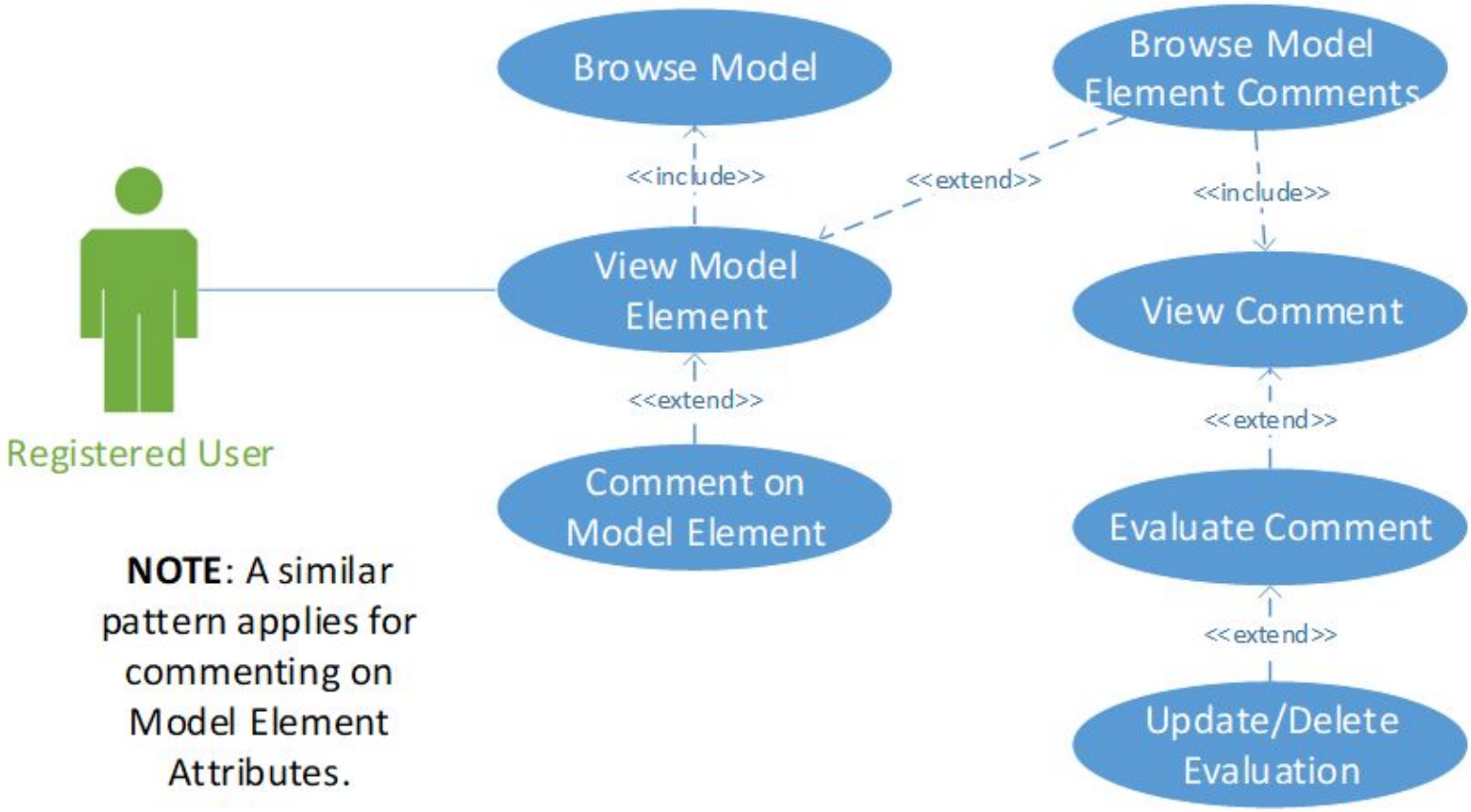
Example Use Case Diagrams

- Green 2.0 Project - Dept. of Civil Engineering, U of T
  - Design of a discussion, analysis, and simulation system for building construction
  - Based on Building Information Model (BIM)
    - Users could see building designs represented as BIM models
    - Users could comment on particular building elements by selecting them in the model
    - The model could be used for analysis/simulation of energy consumption, etc.

Use Case Diagram Example - UCs and Actors



Use Case Diagram Example - Include/Extend



NOTE: A similar pattern applies for commenting on Model Element Attributes.

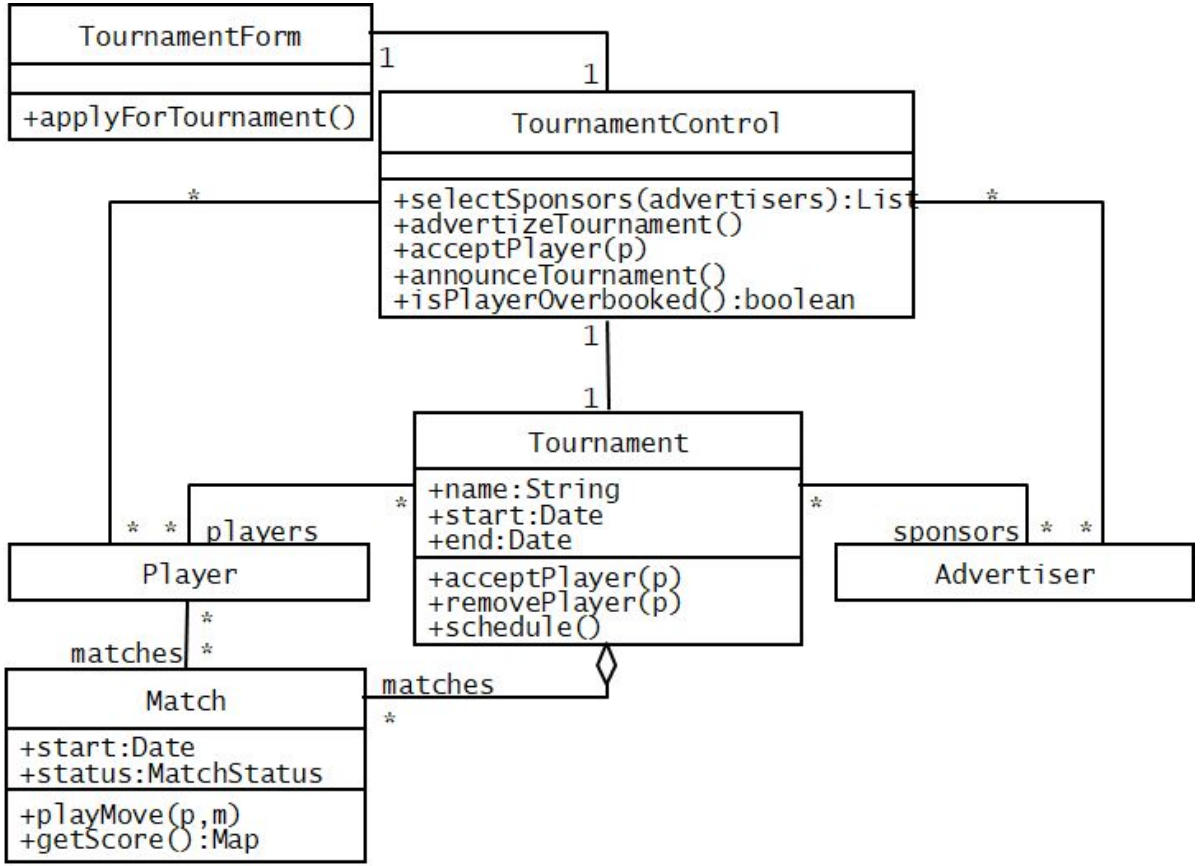
Step 3 - Design

- Implementation details
  - Need to “invent” them
  - We’re “getting closer” to code
- Typically written by the development team
- Artifacts can be:
  - CRC cards (Class Responsibility Collaborator Cards) - Highlight the important classes, their responsibilities and the dependencies among these classes.
  - Class Diagrams - Part of the UML standard. More detailed than CRC
  - Mockups & Wireframes - There are many cool tools out there that help you describe/demonstrate/simulate the UX (user experience) of your program
  - Storyboards, English descriptions, interfaces in code, etc.

Step 3 - Design

- Focus is always a challenge.
- Need to distinguish between two types of objects/components
  - Domain objects - Entities related to the specific problem your program is solving
  - Other objects/components used as “plumbing” that connect domain objects together.
    - Can be used (and reused) in different applications/domains
    - In many cases, these are implementations of various design patterns (adapters, factories, listeners, etc.)
    - Frameworks are good examples:
      - With JUnit, you write the logic of your tests and JUnit takes care of running them and producing reports
      - With various JavaScript frameworks, you create the UI and/or server logic, and the framework takes care of packaging everything as a mobile/web application

Class Diagram Example



[Bruegge & Dutoit. "Object-Oriented Software Engineering Using UML, Patterns, and Java", 3rd Ed., Prentice Hall, 2010

Agile Planning, Summary

- Planning artifacts can be very useful:
  - It’s easy to forget why you are building something. Planning artifacts help remember.
  - Once again, **traceability** is important.
    Utopia … Could trace every:
    - Requirement to a goal,
    - Design feature to a requirement,
    - Line of code to a design feature,
    - Bug fix to issue.
- But, we still want to be agile and focus on deliverables not documentation

Agile Planning, Summary

- There is no silver bullet!
  - Different teams, projects and points in time may require different tools and approaches
- Constantly *evaluate* which new features offer users the most value
  - Better to deploy minimalist features sooner than rich feature sets later
  - **Failing fast** is better than failing slowly!
- First release is no exception:
  - *Minimal Viable Product* mantra of startups

Minimal Viable Product (MVP)

- Concept guiding modern startup thinking
- So you have an idea?
  - What value proposition does it offer which users?
  - What user pain does it alleviate?
  - What problem will they “hire” your product to solve?

    If you have a few minutes, watch Clayton Christensen, Understanding the Job (but please don’t start drinking milkshakes for breakfast)
- Isolate minimal set of features
  - Maximize return on risk/cost

Why MVP?

- If you are right, and close to minimal set:
  - You get to market as quickly as possible, for the least cost
- If you are wrong, you “fail fast”
  - Collected feedback ⇒ Which features were lacking (or wrong)
  - Could be a chance to ***pivot***
- Investors look for intelligently chosen MVP
  - Watch: Steve Blank, No business plan survives first customer contact
- Past experience ... Waterfall plans frequently led to multi-year, multi-million dollar, startup trainwrecks

MVP and Your Team Project

- Officially, you are expected to build a prototype, not a product
  - In this context, prototype = some parts can be faked
  - Expectations depend on how ambitious your project idea is
- Regardless, the MVP concepts still apply:

  Produce maximum value with minimum cost/effort
- The main challenge: **Scoping**
  - Deciding what to build and what not to build
  - Focusing on the important features
  - Being realistic with your plans
- The first few weeks are all about planning
  - And producing useful artifacts as part of the process