Collaborative development

March 3, 2020

Today

- Agile development
- Pair programming
- Collaboration exercises
- Final project selection

Agile development

- Fast paced
- Frequent releases
- Developer centered
  - do we need managers?

Scrum

- A very popular flavor of agile
- Three pillars:
  - transparency
  - inspection
  - adaptation
Three roles

- **Product owner**
  - represents the customer

- **Development team**
  - performs sprints
  - delivers software product

- **Scrum master**
  - Buffer between team and outside world
  - Prevents distractions, barriers

Many aspects of Scrum

- **Sprints**
- **Scrums**
- **Stand-up meetings**
  - what did I do yesterday?
  - what will I do today?
  - do I see any impediment from our goal?
- **Reviews**

Pair programming

- Coding, testing, designing, etc.
- Pair-work facilitates
  - transparency
  - no single point of failure
  - decision making
  - focus

Everything’s better in pairs
Collaboration Exercise

- An exercise game for learning about collaboration
- Developed by Laurie Williams and Lucas Layman at NCSU
©Williams and Layman 2007

Design a transportation device

- Each person, individually, designs a transportation device that can do all of the following:
  - transport people between 1 and 10 miles per hour
  - stop on demand
  - carry at least one person
  - restrain at least one person (so they don't fall out)
  - look nice

- Draw your transportation device. Work alone and don’t look at others’ papers. No talking.
  You have 5 minutes.

Now, let’s integrate

- write down what time you woke up this morning

- together, draw a transportation device that integrates:
  - first riser’s braking system
  - second riser’s restraint system
  - third riser’s propulsion system
  - fourth riser’s device appearance

http://www.youtube.com/watch?v=rG_U12uqRhE
What does this exercise teach us?

• Everyone drew a different solution to the same spec hard to integrate
• Same thing can happen in teams if there is no communication
• Working alone was boring (at least for me)
• Was working together more fun?

Movie script

• Break up into pairs (named pair 1 and pair 2)
• Each pair writes a script that must have:
  — a love interest between well-known movie stars
  — attraction for the 18-45 age bracket
  — explosions... lots of explosions
  — a significant plot twist
• Integrate pair 1’s stars and explosions with pair 2’s romantic storyline and plot twist

What does this exercise teach us?

• It’s easier to integrate 2 parts than 4 parts
• The result likely fits together better than the 4-part meshed transport
• Were the pair-written scripts or individual-drawn transports more creative?

Robotic classroom assistant

• We are going to design a classroom robot responsibilities:
  — person 1: monitor the number of people in the room
  — person 2: mechanism the instructor can use to get students’ attention
  — person 3: mechanism for communication between instructor and students
  — person 4: a marketable, interesting name

Spend three minutes 1 working with 2, 3 with 4
Spend three minutes 1 working with 3, 2 with 4
Spend three minutes 1 working with 4, 2 with 3
Draw the assistant design

- Each person now draws the design of the robotic assistant

What does this exercise teach us?

- Rotation improved everyone’s understanding of the product as a whole.
- Risk management: If a person were to drop out, the team could recover more easily (everyone has a partial understanding)
- Each person got more input, leading to more creative, better solutions

Final project: Topic selection

- Form team of 4 or 5 students
- Select one of the following 4 topics:
  1. MSR 2020 mining challenge
  2. Replication study
  3. Model inference for inferring processes (i.e. specification mining)
  4. EleNa: Elevation-based navigation
- Due: Tuesday March 3, 2020 9 PM EST
  
  https://people.cs.umass.edu/~hconboy/class/2020Spring/CS520/finalProject.pdf

Final project: Selected topic

1. Read some papers
2. Start to develop
3. Create and give a mid-point presentation
4. Continue to develop
5. Create and give a final presentation
6. Write a final report

https://people.cs.umass.edu/~hconboy/class/2020Spring/CS520/finalProject.pdf
Final project:
MSR 2020 mining challenge objectives

• Read 8-10 papers
• Select one or more research questions
• Propose an approach to investigate the research question(s)
• Develop experiments to evaluate the proposed approach by applying to the provided dataset
• Study the experimental results


Final project:
Replication study objectives

• Read 4-5 papers
• Select one of the debugging/testing tools (e.g., SOSRepair)
• Learn about the benchmark (i.e. input data) for the selected tool
• Replicate the experiments to evaluate the selected tool by applying to the same data
• Extend the experiments to further evaluate the selected tool on additional data

Final project:
Specification mining objectives

• Read 4-5 papers
• Select a model inference tool or tools (e.g., Synoptic, InvariMint)
• Select a reasonable way to generate traces
• Develop experiments to evaluate the selected tool(s) by applying to the generated traces
• Study the experimental results
  — Develop an automated approach to diff two FSAs

https://github.com/ModellInference/synoptic

Final project:
Elevation-based Navigation (EleNa)

• Goal: Develop a software system that determines, given a start and an end location, a route that maximizes or minimizes elevation gain, while limiting the total distance between the two locations to x% of the shortest path
• Components:
  — Data model that represents the geodata
  — A component that populates the data model, querying, e.g., https://www.openstreetmap.org
  — The actual routing algorithm that performs the multi-objective optimization
  — Another component that outputs or renders the computed route

https://github.com/ModelInference/synoptic
Final project:
EleNa objectives

- Read any necessary technical documents
- Design one or more components
- Implement the designed component(s)
- Build a test plan for the implemented component(s) and carry out that test plan