Objectives

- Planning
- Team Work

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Review: Picasso

- It's okay to be a little intimidated
- Let that motivate you
- But *believe* that you can tackle the project

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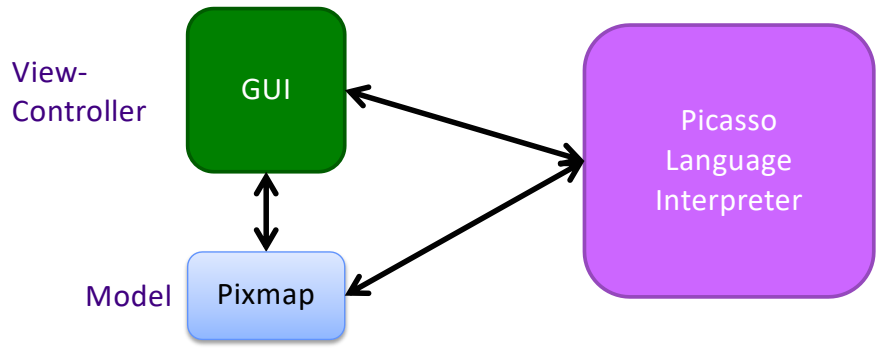
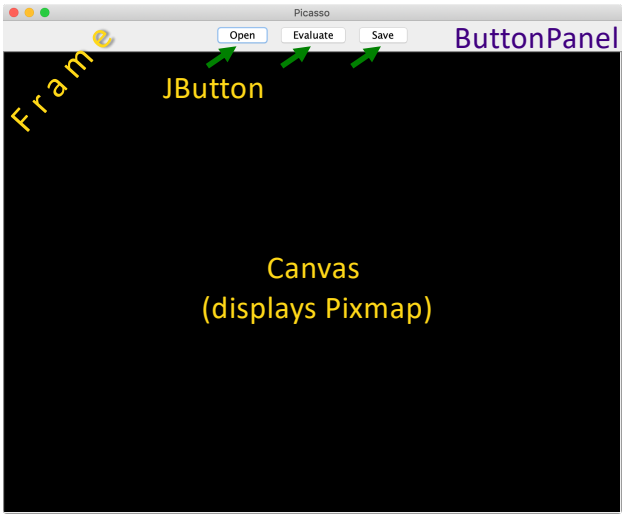
Review

- What is the Picasso project?
- What are the major components of the existing Picasso code base?
- What parts of project need to be completed?
- (Rhetorical) Who are your teammates?

Picasso Architecture



Review: Picasso GUI



Picasso's GUI uses classes from two main Java packages:

- Abstract Windowing Toolkit: java.awt
- Swing: javax.swing

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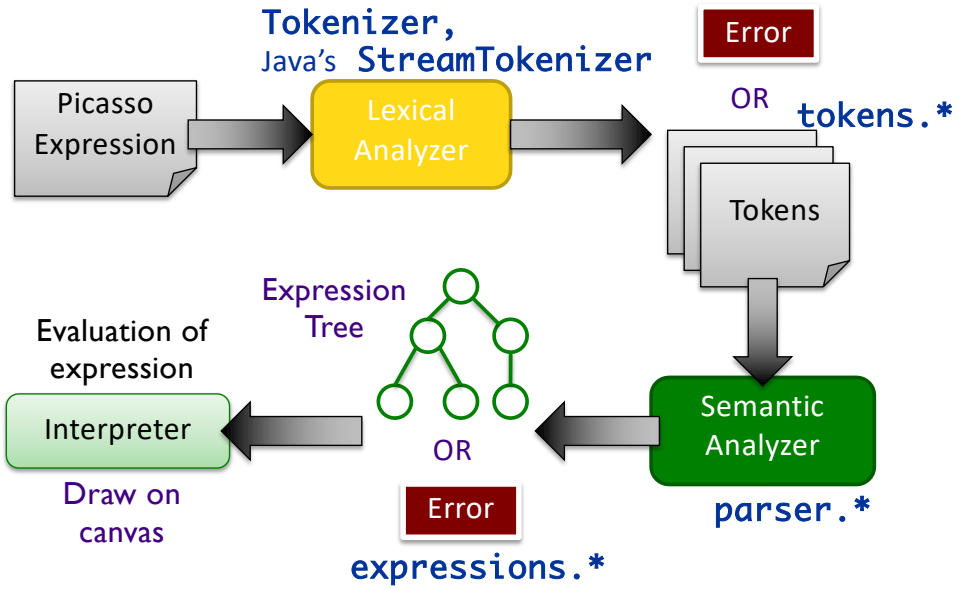
Review: Interpreting the Picasso Language



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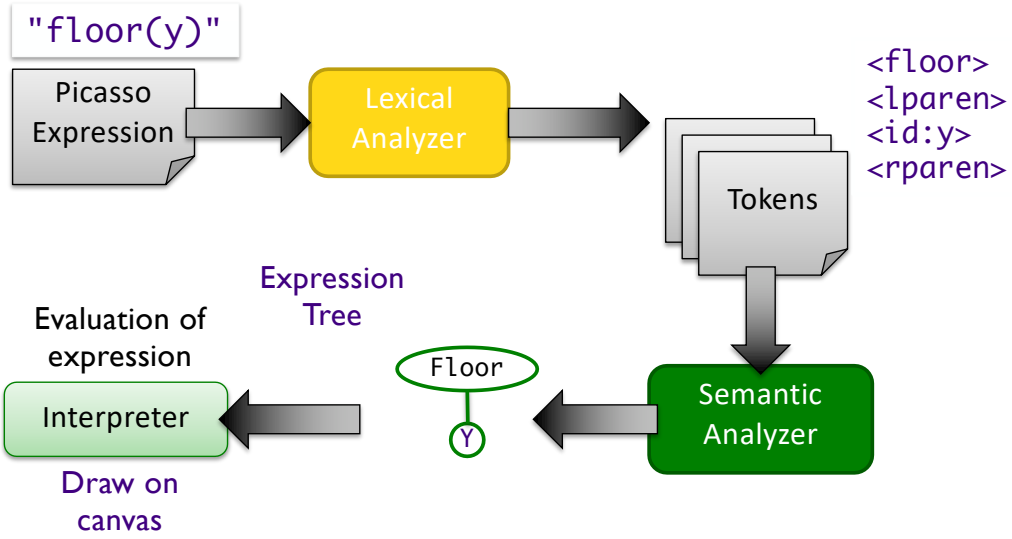
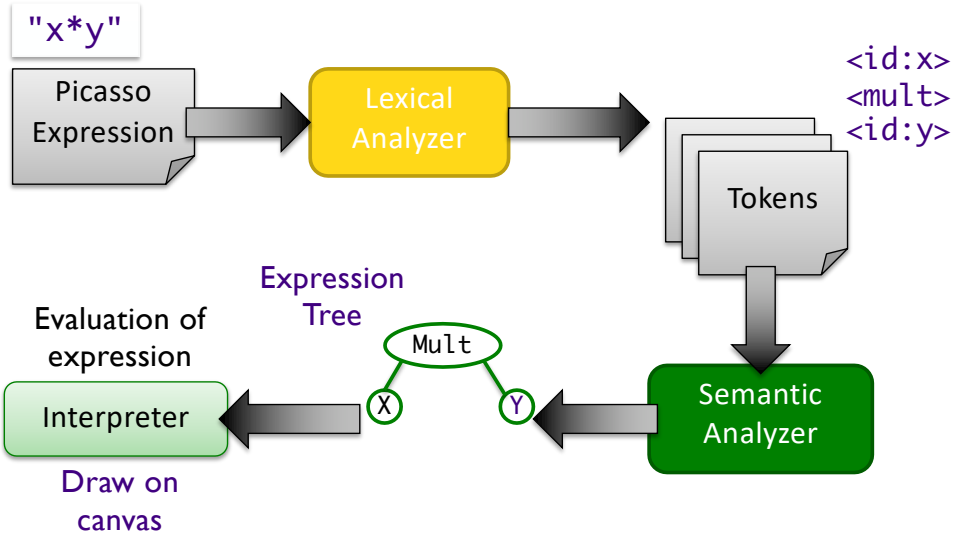
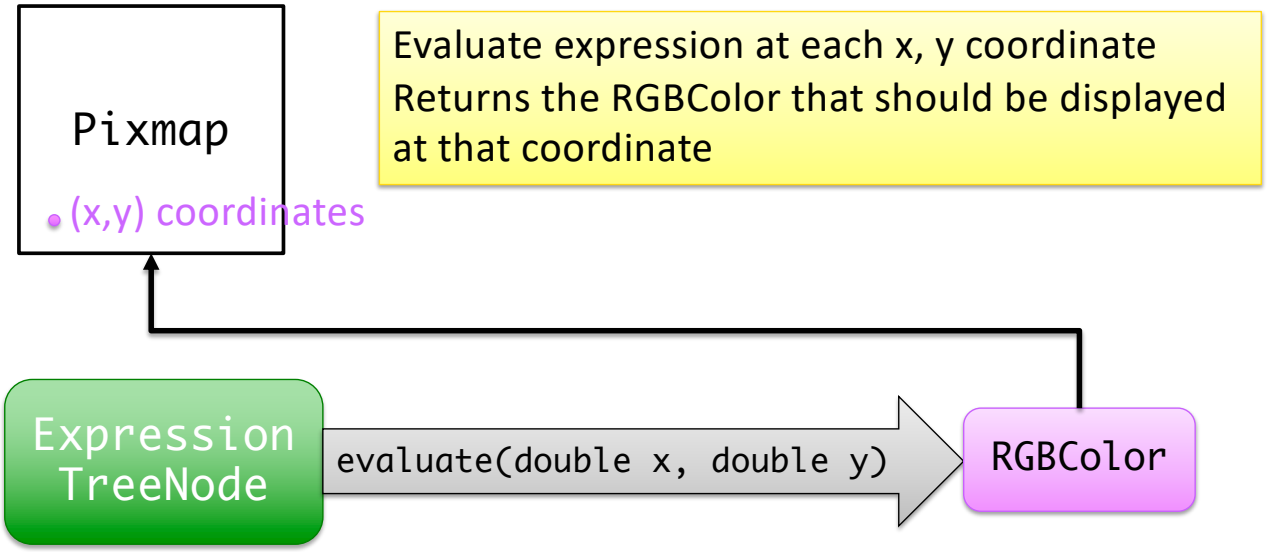
Review: Interpreting the Picasso Language



Interpreting the Picasso Language



Evaluator: Expression Evaluation



What Steps Need To Be Completed?

- Model: Images
  - API
  - State
- GUI
  - Expression user interface (interactive)
  - Open expression files (batch)
  - Call Picasso interpreter
  - Error handling
- Picasso interpreter
  - Parse expressions (functions, operations, variables, …)
    - **Handle errors** appropriately
  - Evaluate expressions
    - Manipulate canvas appropriately
- Extensions
- **TESTING!**

What Classes are Dependent on Each Other?

- How tightly coupled are they?

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Dependencies

- Interpreter classes (tokens, analyzer, expression) are very dependent on each other
- Need to hook GUI to Interpreter
- Need to hook Image/Canvas to GUI and Interpreter
- Can test without other pieces but easier and more satisfying to see results displayed

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How is the floor function parsed?

(in given code)

- What classes are needed?
- How would you add another function to the language?
  - For example, consider how you would add the cosine function

How is the floor function parsed?

(in given code)

- Has a *token* to represent the *floor* function
  - Same prefix as function, e.g., `FloorToken.java`
  - `floor` is listed in `functions.conf`
- `FloorAnalyzer` is the *semantic analyzer* for the function
  - Note has same prefix as function: `FloorAnalyzer.java`
  - `Analyzer` class implements `SemanticAnalyzerInterface`, returns an instance of `ExpressionTreeNode`
    - Specifically: `Floor` object

Why is the naming important for the token and analyzer?

Process of Adding Cosine Function to the Picasso Language

(in given code)

- Add Function name to `functions.conf`
- Create a *token* for the cosine function
  - Same prefix as new function, e.g., `CosToken.java`
- Create a *semantic analyzer* for the function with same prefix as function, e.g., `CosAnalyzer.java`
  - `Analyzer` class implements `SemanticAnalyzerInterface`, returns an instance of `ExpressionTreeNode`
- Create a child of `ExpressionTreeNode` for function: `Cosine.java`

Name/prefix must match for all but ETN

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Process of Adding Cosine Function to the Picasso Language

(in given code)

- Add Function name to `functions.conf`
- Create a *token* for the cosine function
  - Same prefix as new function, e.g., `CosToken.java`
- Create a *semantic analyzer* for the function with same prefix as function, e.g., `CosAnalyzer.java`
  - `Analyzer` class implements `SemanticAnalyzerInterface`, returns an instance of `ExpressionTreeNo`
- Create a child of `ExpressionTreeNode` for function: `Cosine.java`

Using Java *reflection* to map tokens to analyzers. (How would we do this otherwise?)

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Extensions

- Extensions could affect your code design
  - Where could change → abstraction
- When does your team need to decide?
  - Technically, not until the final implementation deadline
    - But, see above

Planning for Preliminary Implementation

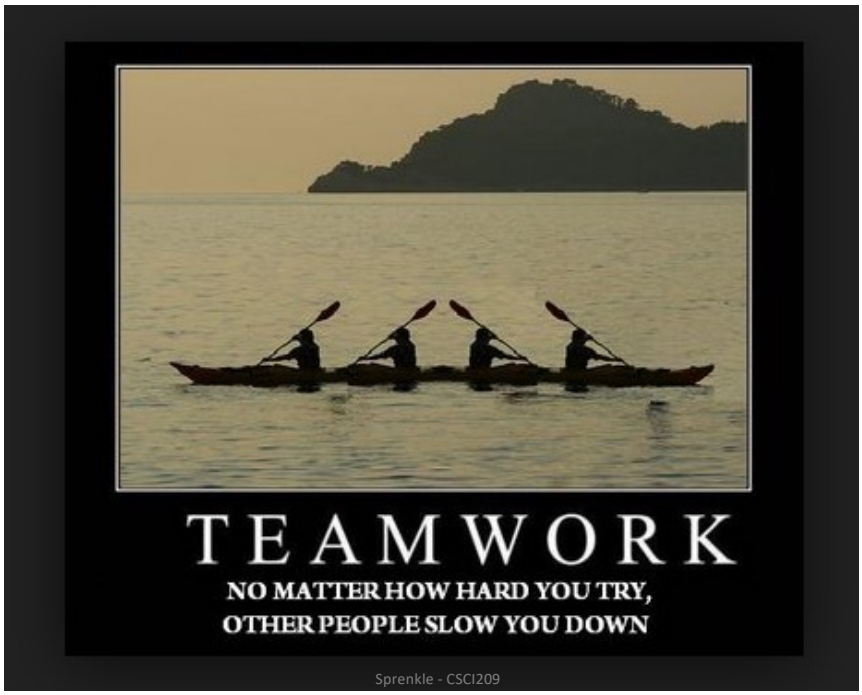
- Goal is to have you do enough that you'll see issues with an initial design you create and adjust
- Implementation requirement (see project description page for more)
  - Input an expression interactively that includes at least one binary operator and display an image from the resulting expression
  - Tag the version in Git
- Requirement involves a lot of different pieces
  - Don't go too far in breadth, more depth
    - See design issues sooner
      - "We need method/functionality X in class Y"
- Don't stop if you have more time
  - Keep going to find issues earlier

Planning: Tasks/Steps

- Testing
- Think about iterative development
  - Not recommended: write all the tokens/parsers/expressions first
  - What is an appropriate process for this project?
- Decide on APIs where there are dependencies
  - Parameters and what is returned

Planning: Division of Tasks

- Work in subgroups?
- Consider how not to step on each other's toes
  - Reminder: Use git branches!
- Consider best # of people per part
  - Likely will keep changing as work gets done and you learn your design
- Not recommended: Person X does all the testing
  - Perhaps pair people up to write tests for each other



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Teams Work Best When They are **Interdependent**

- In code terms, we want *loose coupling*
  - Depend on each other but don't depend on their details
- Consider
  - Are you allowing your team to truly be interdependent?
  - Who might be you be ignoring?
  - Who might be allowing themselves to feel inadequate?
  - How do you show appreciation for each other and yourself?

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Review: Collaboration

- What is our workflow in Git when collaborating?
- What did you like about how your team worked together on previous project?
  - What didn't you like?

Review: Collaboration: Workflow – Seeking Feedback

1. Create a branch from `main` for your work
   - Commit periodically
   - Write descriptive comments so your team members know what you did and why
2. Push your branch
3. On GitHub, open a ***Pull Request*** on your branch
   - Discuss and review potential changes – can still update
   - You can tag your teammates to let them know that you've completed your work
4. Merge pull request into `main` branch
5. In Eclipse, pull `main`

Collaboration Models

Good

- Team physically works all together or in subteams
- Division of labor is clear
  - Keep track of tasks, what has been completed in a document
  - Agree on team deadlines
- Good, frequent communication
  - Be a sounding board for your teammate even if you don't understand everything they are working on

Bad

- Multiple people are trying to do the same task
  - Overwriting each other's code
- Everyone is working in the main branch
- Make a plan as a team, then someone goes rogue
- Asking for help too late

Student Questions

- Any code we shouldn't change?
  - There is likely code that you won't change but depends on your extensions
- What if our design isn't perfect?
  - It won't be
  - BUT try to get it to pretty good, especially before the intermediate deadline

Implementation/Code Questions?

Looking Ahead

- Friday after Thanksgiving, preliminary implementation deadline
  - Demo in class