How it works
QUANT
An Educational Language
Quant is "a simple, English-based programming language created for kids".

What is Quant?
Another simple example:

Farmer Joe has a pasture with cows and chickens. I see 120 cows and 25 chickens. How many legs do I see?

An animal has legs.
A cow is an animal--its legs are 4.
A chicken is an animal: its legs are 2.

What is the total legs of 120 cows plus the total legs of 25 chickens?
Why Quant?

Meet Enzo

- 3rd Grade
- Loves Minecraft
- Avid interneter

- Struggling with MATH
- 3rd Grade
- Loves Minecraft
- Avid interneter
- Struggling with MATH
The Problem

Elementary students have a hard time relating to their first word problems.

Elementary teachers have a hard time helping them relate.

The solution: Quant
How?

It's.... Simple

Accessible

Familiar

Educational
What can Quant do?

A working geometry example.
How it works

Syntax

A Technical View

Runtime and Dependencies

Jux and Java CUP

Written in Java, compiles and runs on the JRE.

Translates to Java, produces an executable jar with a .jux extension.
Syntax

Expressions
* Use operation on two type-compatible value-holding fields
* Keywords
  - arithmetic
  - conversions
  - iteration
  - assignment
  - operators

Assignment
* Assign value to variables
* Keywords
  - is, set...to
  - has

Control Flow
* Keywords
  - if...else...then
  - while...
* Comparisons
  - less than
  - greater than
  - equal to
* Boolean
  - if
  - is

Types
* Primitives
  - Integers
  - Strings
  - Objects
  - User-defined data types
  - other features:
* Units
* Unit conversions
* Operations on collections of user-defined types
* extreme syntactic sugar (What is ...? Is ...?

A is 7.
B is 4 plus A.
What is B?

A is a square.
A has width 7.
B is a rectangle.
B has width 8 and height 7.
Is the area of A greater than the area of B?

A is 7.
B is 8.
Is B greater than A?
If A is less than B, then B is A plus B.

A is 4115.
B is an octocat.
Expressions

* Use operation on two type-compatible value-holding fields
* Keywords
  - arithmetic
  - conversions
  - iteration
  - assignment
  - operators

A is 7.
B is 4 plus A.
What is B?
Assignment

* Assign value to variables
* Keywords
  - is, set...to
  - has

A is a square.
A has width 7.
B is a rectangle.
B has width 6 and height 7.
Is the area of A greater than the area of B?
Control Flow

* Keywords
  - If...else...then
  - While...
* Comparisons
  - Less than
  - Greater than
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A is 7.
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Types

* Primitives
  - Integers
  - Strings

* Objects
  - User-defined data types

Other features:
* Units
* Unit conversions
* Operations on collections of user-defined types
* extreme syntactic sugaring (What is ... ? Is ... ? )

A is 4115.
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A Technical View

Diagram:

- Lexer
  - Token
  - Parser
    - Nodes
    - Symbol Record
    - AST & AST Components
    - Code
    - Translator
      - Arranged Code
      - Static Code
        - Java File
        - JavaC
Runtime and Dependencies

JLex and Java CUP

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Translates to Java; produces executable jar with a .fun extension.
Team

Aubrey Alston - Project Manager
Ashley Kling - System Architect
Audrey Seville - System Integrator
Ricky Goncalves - System Tester
Sabina Smajlaj - Language Guru
Development process

Agile incremental and iterative approach in four phases:

(1) Specification
(2) Collaboration
(3) Testing
(4) Review and deployment
Conclusions

Lessons Learned

Meet often.

Lessons Learned

Know the features that will make your language.

Lessons Learned

Plan, and do it early.

Conclusion

* Simple, accessible and friendly language
* Holistic approach to teaching mathematics
* Change the way students learn math
* Encourage higher-order thinking

**You want your language to mean something, but it takes work to make it happen.
Lessons Learned

Meet often.
Lessons Learned

Know the features that will make your language.
Lessons Learned

Plan, and do it early.
Conclusion

* Simple, accessible and friendly language
* Holistic approach to teaching mathematics
* Change the way students learn math
* Encourage higher-order thinking

**You want your language to mean something, but it takes work to make it happen.**
Now Enzo can learn Math easily!
How it works