Traits and Parametric Types

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Do you have any questions about the quiz?

Minute essay comments:

- The API should become your friend.
- Linux on your computer?
In addition to class and object declarations, Scala has a type declaration called a trait.

A trait is very similar to a class, but has some significant differences.

- You can't pass arguments to a trait.
- Traits are always abstract.
- You can inherit from multiple traits using with. It is called mixing them in. When you call a method on a supertype (potentially using super) it looks backward through the inherited types to resolve.
Type Parameters

- Scala allows you to pass in type parameters similar to normal arguments.
- Type parameters go in [] instead of ().
- We have seen these on types like List and Array already.
Type parameters provide us with parametric polymorphism, another form of Universal polymorphism.

Code will work on any appropriate type arguments.
Parametric Classes/Traits

- You can add type parameters after the name of a class or a trait.
- This specifies an unknown type that instances should work with.
- The actual type is specified at creation. Not always needed if inference system can figure out from arguments.
- This is how you make collections that can hold any type.
Parametric Functions

- You can also add type parameters after function/method names.
- These specify types that the function/method will work on.
- These are rarely specified as they should be identifiable from the arguments.
A parametric type of [A] can only be used in a way that is applicable to Any because A could be anything.

You can place bounds on the type with <: and >:. The <: is far more common. [A <: B] means that A must be a subtype of B to be used.

The <\% indicates you accept things with implicit conversions.
Ordered Trait

- This trait gives you all comparison operators if you just implement a compare method.
- It is parametric on the type to compare to (typically the inheriting type).
- This trait is good for anything that has a natural order to it.
Let's take what time we have left and continue putting pieces into the drawing program.

Hopefully we can get the command processor working.
We move on to multithreading next class. What aspects of polymorphism (inclusion or parametric) do you have questions about?