

Slide 1

Administrivia

- Reminder: Homework 7 due today.

Slide 2

Minute Essay From Last Lecture

- (What can we do using files?)
- (Many suggestions.)
- Program to calculate grades.
- Memory games / flash-card program.
- Games that track wins / losses.

Case Classes — Review/Recap

Slide 3

- Case classes are a very simple example of a *user-defined type* (analogous to predefined types such as `Int`, `String`, `List`, etc.). (In object-oriented terms, in their simplest form they're a simple kind of class, with data/variables only.)
- What they give you is a way to define a named type (e.g., `Rational`) that represents a collection of related objects (e.g., the numerator and denominator) and give the parts names.
- Example — checkbook program, once more, with case class for transactions.

A Little About Errors in Scala (Exceptions)

Slide 4

- You've noticed that some kinds of user-input error result in rather ugly program crashes. If you wonder why, and what to do about it . . .
- The "why": If writing programs meant to teach you about programming, has its advantages, as compared to other languages, which sometimes allow you to continue even when it wouldn't make sense to do so. (Think about what happens if you prompt the human for an integer and he/she enters something else.)
- The "how": Crashes come from Scala's main mechanism ("exceptions") for signalling that something has gone wrong.
A short discussion of errors in general, then . . .

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Errors in Programs

- Some errors in programs are caused by programmer mistakes — e.g., trying to access an element of an array using an index that's out of bounds (in Scala, negative, or more than the array size minus 1).
- Other errors have external causes — e.g., input that's not what was intended, or files that can't be found.
- What to do about errors is something to decide when designing a programming language.
- Different languages use different approaches:
Some try to detect and warn about programmer mistakes (safer but possibly inefficient); others don't.
All(?) try to detect and do something about external-causes mistakes, but what they do varies.

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Errors in Programs, Continued

- Some example errors:
 - Accessing an array element with an out-of-bounds index.
 - Getting square root of a negative number, with a function that returns a `Double`.
 - Converting text to an `Int`, when the text doesn't represent an integer.
 - Opening a file when there is no such file.
- Some things the programming language could do:
 - Ignore the error (only for programmer mistakes).
 - Return a “didn't work” value (not always possible).
 - Set a global variable somewhere (ugly).
 - Bail out of normal program control flow via *exception*.

A Little (More) About Errors in Scala

Slide 7

- Scala uses exceptions to signal most kinds of errors, including some programmer mistakes. When some kinds of errors are detected, the code that detects them (e.g., `toInt` or `fromFile`) “throws an exception”.
- By default, this causes the program to crash, with error messages that are meant to be helpful to the programmer — but probably will baffle or annoy an end user.
- If you want some other behavior, you can “catch the exception”.

A very bad idea for programmer mistakes; a very *good* idea for other errors.
(And I usually put a lot more emphasis on this, but this semester with this textbook I haven't.)

Details in CS2, but for now a short example . . .

Minute Essay

Slide 8

- None — quiz.