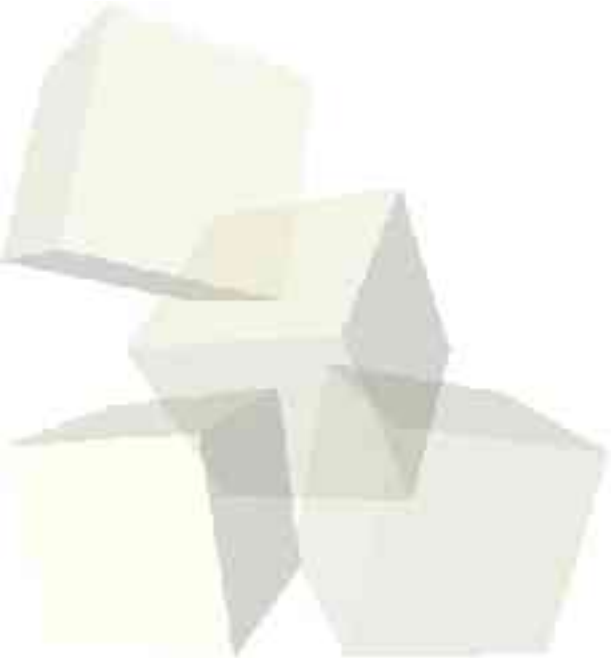
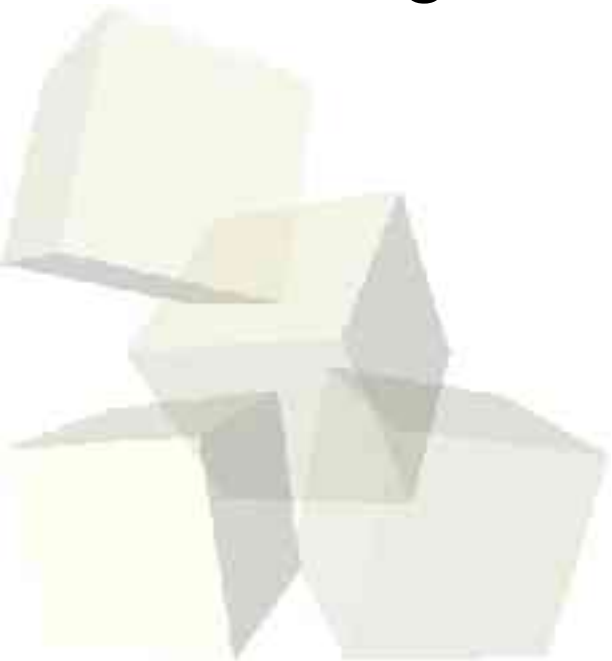
Using Continuations

11-29-2004



Opening Discussion

- What did we start talking about on the Monday before Thanksgiving (that's the day everyone was very wet)?
- Do you have any questions about the assignments?



Terms from Last Time

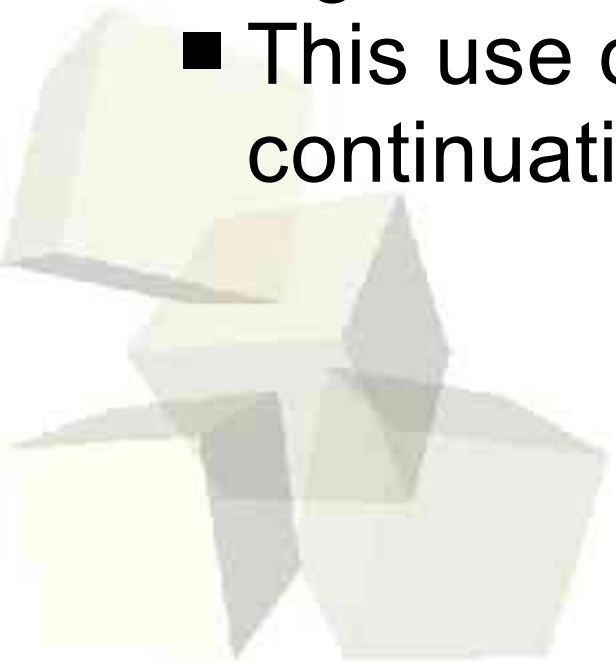
- Context – This is where a program is in its execution when a certain statement is reached.
- Escape routine – This would be a function call that terminates execution.
- Continuation – This is a control structure where the program remembers the context of a call, then can later execute an escape routine to return to that context.

Continuations in Scheme

- To use a continuation in Scheme we use the function call-with-current-continuation. We pass this function one argument, which is a receiver function. That function should take one argument which will be the continuation.
- At any point in the receiver we can call the continuation with a value and the program will jump back to the context of call-with-current-continuation and substitute that value.
- Note that the receiver should be curried.

Continuations as Break-outs

- One use of a continuation is to short-circuit some computation. In this regard it is similar to using a break statement in a loop in C.
- This can make things more efficient without significantly complicating the code.
- This use of a continuation always calls the continuation or throw it away.



Loops with Continuations

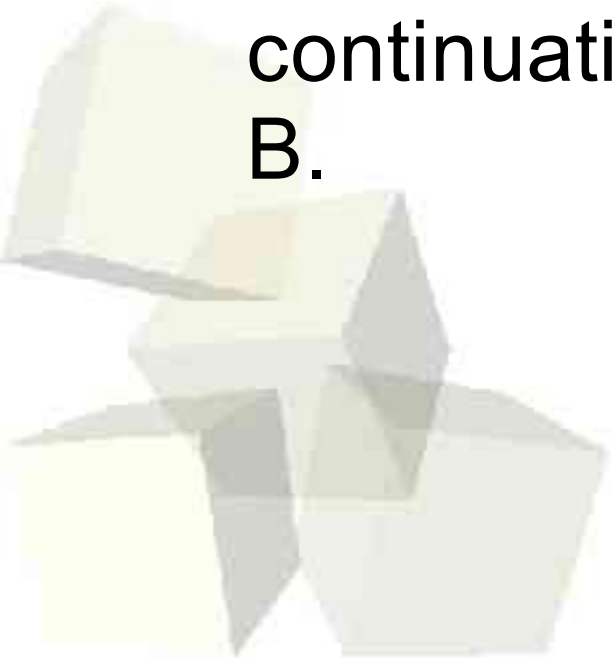
- We can also do loops with continuations if the continuation “escapes” from where it was created. The logic for this becomes significantly more complex.
- This general idea of having a continuation escape from where it was created can make continuations expensive because the call stack must be saved in order to preserve the continuation.

Co-routines

- Another construct that we don't see much in modern programming languages is the co-routine. This is a set of functions that can transfer control to one another without actually terminating.
- For example, two functions A and B can be set up so that we start A, then A starts B. B will then resume A where it had left off and later A will resume B again. The two functions continue to trade off control.

Co-routines with Continuations

- This type of programming structure can be implemented nicely with continuations. When A calls B it passes a continuation into B that B can use to resume A. Similarly, when B resumes A, it provides a continuation that A can later use to resume B.



Minute Essay

- Now that you know what continuations can be used for, do you think you would ever use them if your language provided them?
- Let's discuss due dates.