

Programming Language Theory

Section 1

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1. Discuss the advantages and disadvantages of using continuations.
 - A. Long story short, a continuation captures the program's control flow at a specific moment, allowing you to save and later resume the execution from that point. Capturing the program's control flow is related to the stack, also continuations can be powerful tools for implementing error-handling mechanisms or coroutines. They allow you to capture and manipulate the control flow of a program explicitly.
 - B. The main advantage of the continuation is the explicit control of the flow by the user. By allowing this, lots of programming features can be implemented. As we discussed in class, exception handling, which is non-local exits, allows the program to jump out of nested logic to exit and simplify error handling and resource cleanup. Also, Asynchronous Programming or Logic Programming is possible since we can control the flow of the computation explicitly. Suspension or resumption of the control is possible as well as setting the constraint for the execution.
 - C. The disadvantage of continuation depends on the language features. In general, continuation is used with a continuation passing style in the functional programming language. Its style makes code more complex and harder to read. Also, debugging would be more challenging, since it requires thinking about its continuation, such as stack frames, etc. Not only the CPS, other than functional languages, there are difficulties in resource management. Such that stack frames are involved with memory or certain file handling, the resource should be handled properly. Also, since stack frames are captured and stored, continuations can introduce overhead in terms of performance. Every function call requires the creation of a new continuation.
2. Discuss the role of the lambda function when implementing continuations for KCFAE.
 - A. The role of the lambda function is explicitly passing in the form of a continuation. In KCFAE, the expressions take an extra argument at the interpreter level, an explicit continuation. Lambda functions are used to support this function. The calling function is required to supply a procedure that will be expressed with a lambda function, and it will be invoked with the subroutine's return value. Overall, Lambda functions in KCFAE are used to control the flow of the program and handle

the results of computations as the procedure.