Cooperative Task Management without Manual Stack Management
or, Event-driven Programming is Not the Opposite of Threaded Programming
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Concepts

Task Management

Serial: Task finishes and then yields control

Preemptive: Control can be preempted from a particular task

Cooperative: A task yields control at well-defined points during execution
Concepts

Stack Management

Automatic: Using program stack provided by the procedural Language

Manual: Programming language procedures ripped into different Event Handlers
Event Handlers

E1

initiate I/O

register a Continuation (data, E2)

Terminate
Event Handlers

E2

Code after I/O completion

Terminate
Manual Stack Management Drawbacks

- The program becomes less readable
- Difficult to debug (Stack Unrecoverable)
- Two or more language functions represent a single conceptual function
- More problems with I/O in functions having loops
- Software Evolution
Ideal Approach

• Task Management
  Cooperative
  - The middle ground between Serial and Preemptive styles

• Stack Management
  Automatic
  - For its readability and lack burden on the programmer
What people at Microsoft Think?

• Two groups of developers
  – One supporting Manual Stack Management
  – The other strongly advocating the Automatic Stack Management
• Pieces of Code exist written using both the styles of Stack Management
• Need to find a glue!!
Solution

• Cooperative Tasks - Fibers and Threads
• Manual Calling Automatic and Automatic Calling Manual
• Use Adaptors to reconcile
Implementation

• Farsite
  – A serverless file system
  – Runs as a daemon on Windows NT OS

• Ucom
  – A wireless phone application
  – Designed for Windows CE
Conclusion

• Issues of Task Management and Stack Management can be considered independently of each other

• Code pieces written in Manual and Automatic Stack management styles can coexist in a program

• This is achieved at the cost of embedding adaptors in the original code; not always desirable!