

# Code Generation

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# Motivation

- Every compiler is a code generator
  - We don't write binary
  - Or even ASM
- Every programmer is a code generator
- Code generation = the computer helping us make programs
  - Typically implies raising the level of abstraction

# Why?

- Language verbosity & lack of suitable constructs
- Lack of metaprogramming facilities
- Because generating text is (relatively) easy

# Snippets

- Visual Studio snippets
  - Predefined chunks of text
  - Placeholders for parts that need to be filled in
- ReSharper live templates
  - More context-aware
  - Executable macros
- Embedded DSLs
  - Mnemonics (pseudo DSLs)
  - Emmet, ZenSharp

# Generate Menu

- Generative snippets can only go so far
- All configuration options must be embedded
- Dedicated Generate menu takes things further
- Effectively, a mini code generation app inside your IDE

# Preprocessor?

- .NET does not support preprocessing
- In C++, preprocessing happens before compilation
- You can define macros which generate code
- ReSharper can help you unroll these macros

# T4

- Text templating transformation toolkit
- Special processing of .tt files
- Effectively a text template with built-in C# code
  - Just like Razor views ☺
- Typically produces a single output file
  - Can be hacked to produce more than one

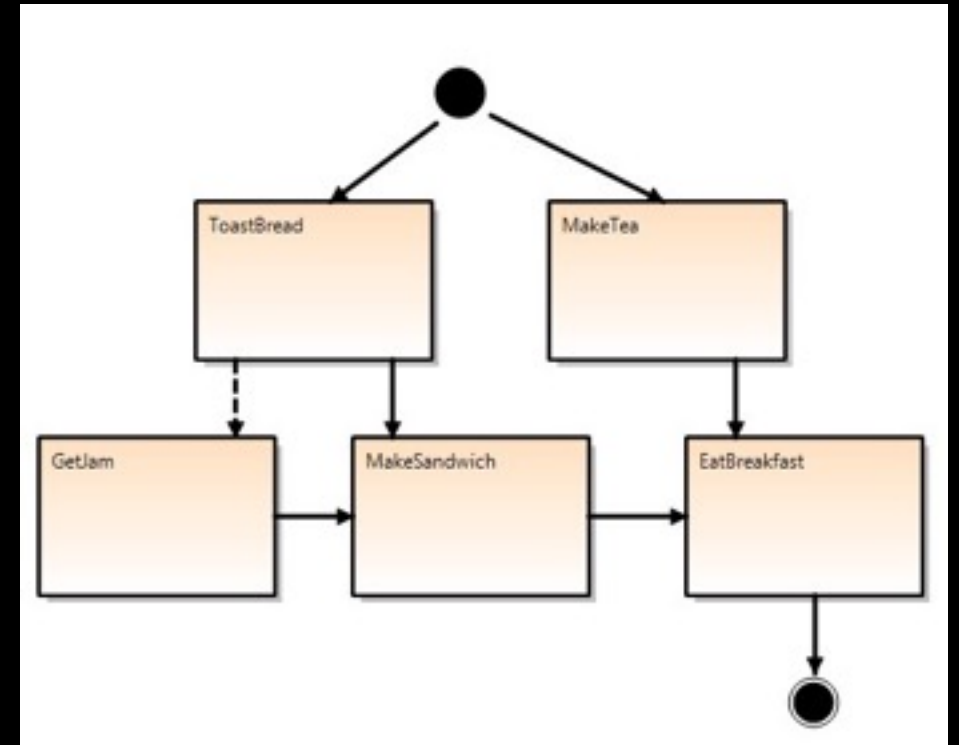
# Custom tools

- T4 is a specific example of a custom tool
- A custom tools is just a program
  - Runs when a file is saved
  - Can do practically anything (it's similar to a VS add-in)
- Example
  - Define an XML file with a model
  - Generate entities, database, UI bindings via XSLT transforms
  - Generated files get added as subfiles in VS



# Visualization & Modeling SDK

- Formerly known as DSL Tools
- Free SDK for visual development
  - Requires VS SDK
- Edit visual structure
  - Results in an XML file
- Define a transformation (e.g., T4)
  - Generates final code



# Going Meta

- Metaprogramming = executable code that affects AST
- Before compilation
  - C++ preprocessing (but doesn't manipulate DSL).
- After compilation:
  - PostSharp
- During compilation
  - Metaprogramming-aware languages
  - Nemerle, Boo (dead?)
  - Roslyn ain't here

# Code Generation Software

- Visual Studio (or your favourite IDE), R#
- General-purpose templating generator (e.g., CodeSmith)
- ORM generators (e.g., LLBLGen)
- Domain front-ends (Mathematica, MPS)
- Domain transformations (X2C, Blackmire)
- Code generation API/REPL

# Thank You!

- Questions?
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