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The Linux Kernel Configurator as a Feature Modeling Tool
Workshop on Analyses of Software Product Lines (ASPL 2008)

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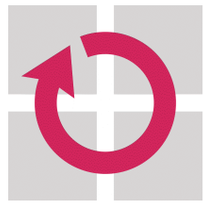


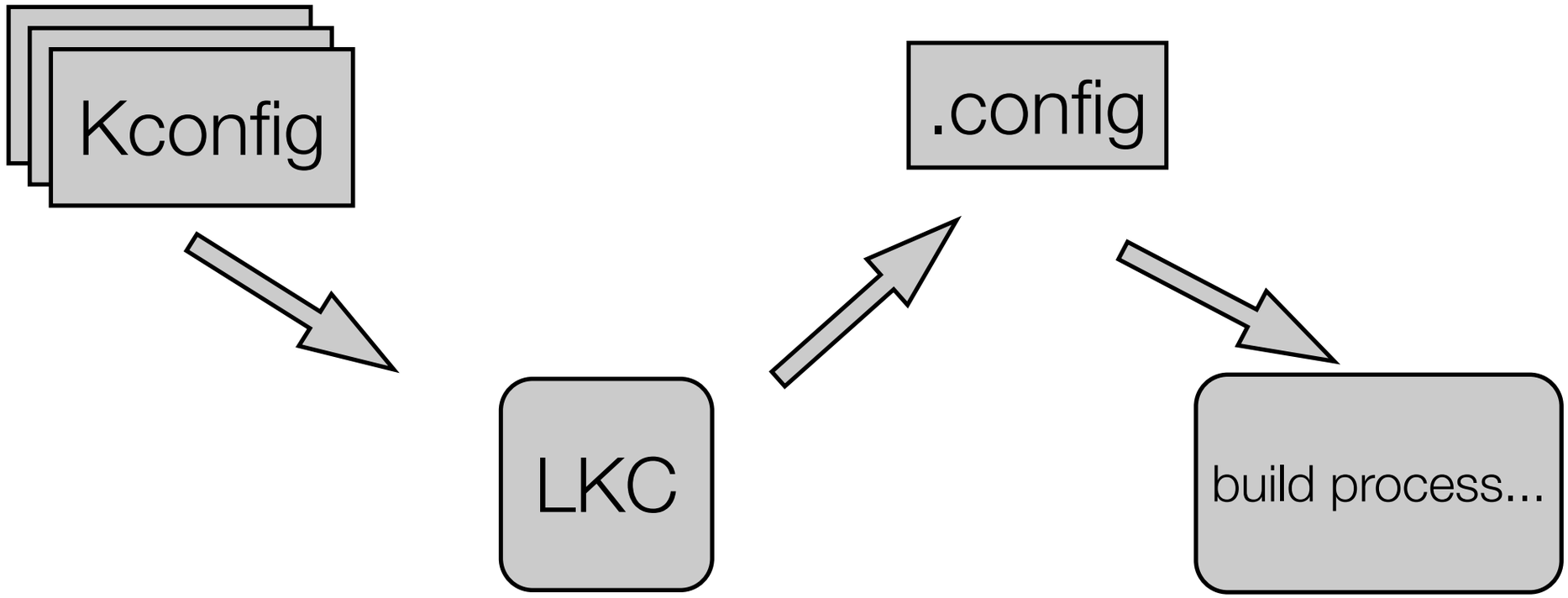
Motivation

- The problem of *Variability Management*
  - Not only relevant to the SPL community
  - What are the others doing?
    - The open-source community
- We study the configuration of NFPs
  - Tool-based approach
  - Feature model centered approach

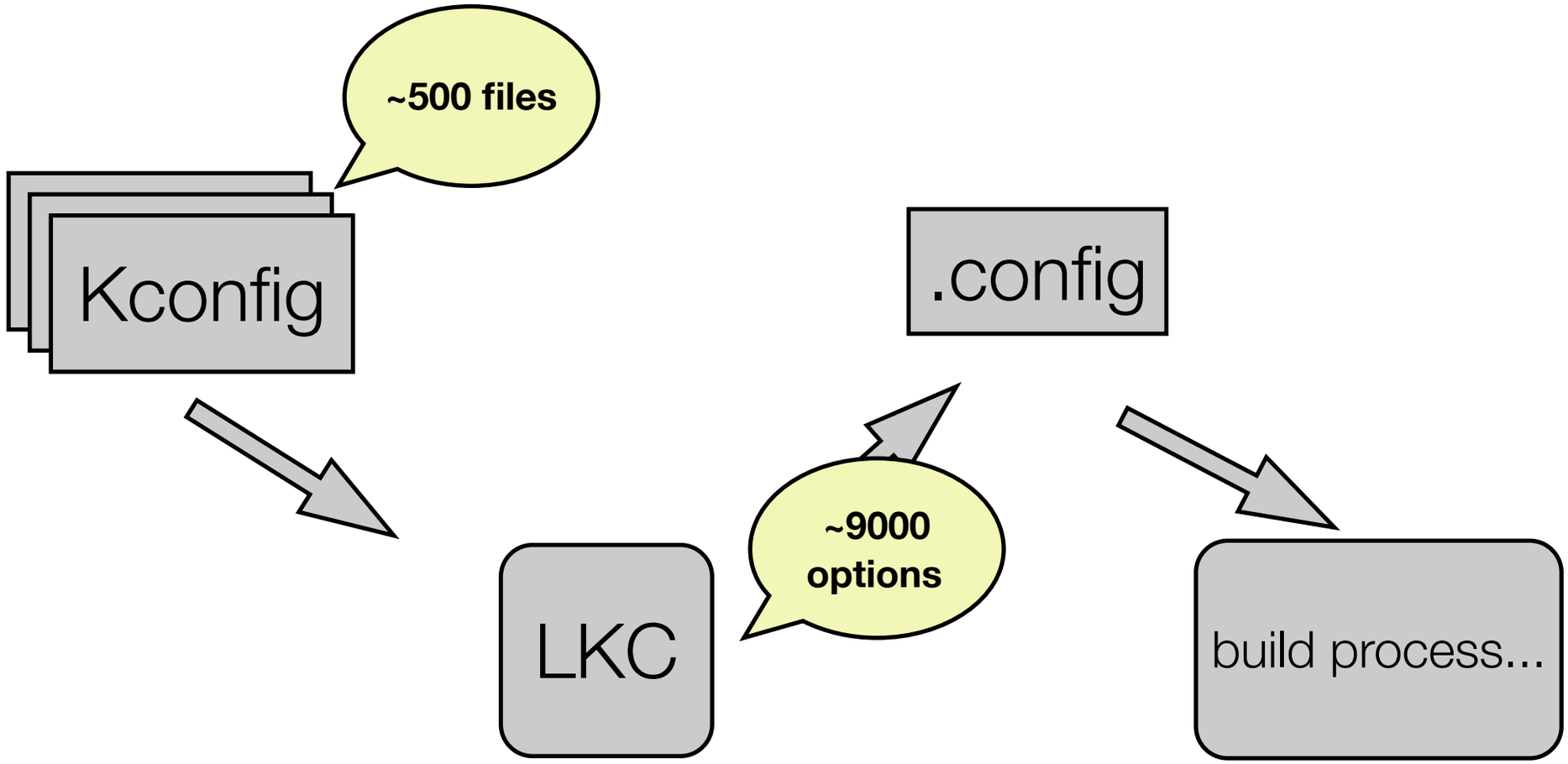
The Linux Kernel Configurator (LKC)

- An open source project
- Used by *developers* and *users* to configure Kernels
- Started in 2001 after other attempts
- Supports a special development approach

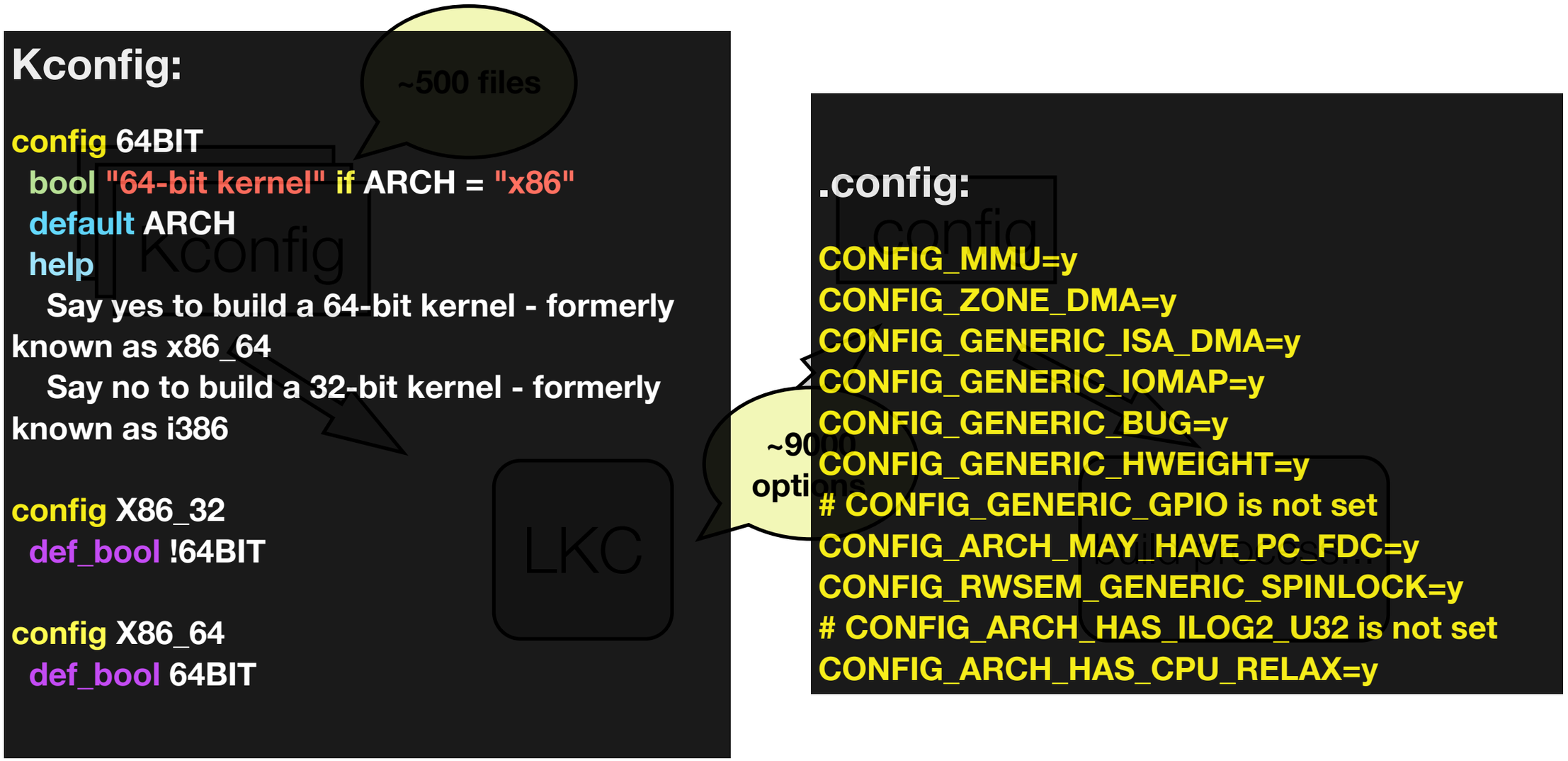
LKC for Kernel Development



LKC for Kernel Development



LKC for Kernel Development



LKC Language (config. options)

- types: boolean, tristate, string, hex and integer
- input prompt
- default value
- dependencies
- reverse dependencies
- numerical ranges
- help text

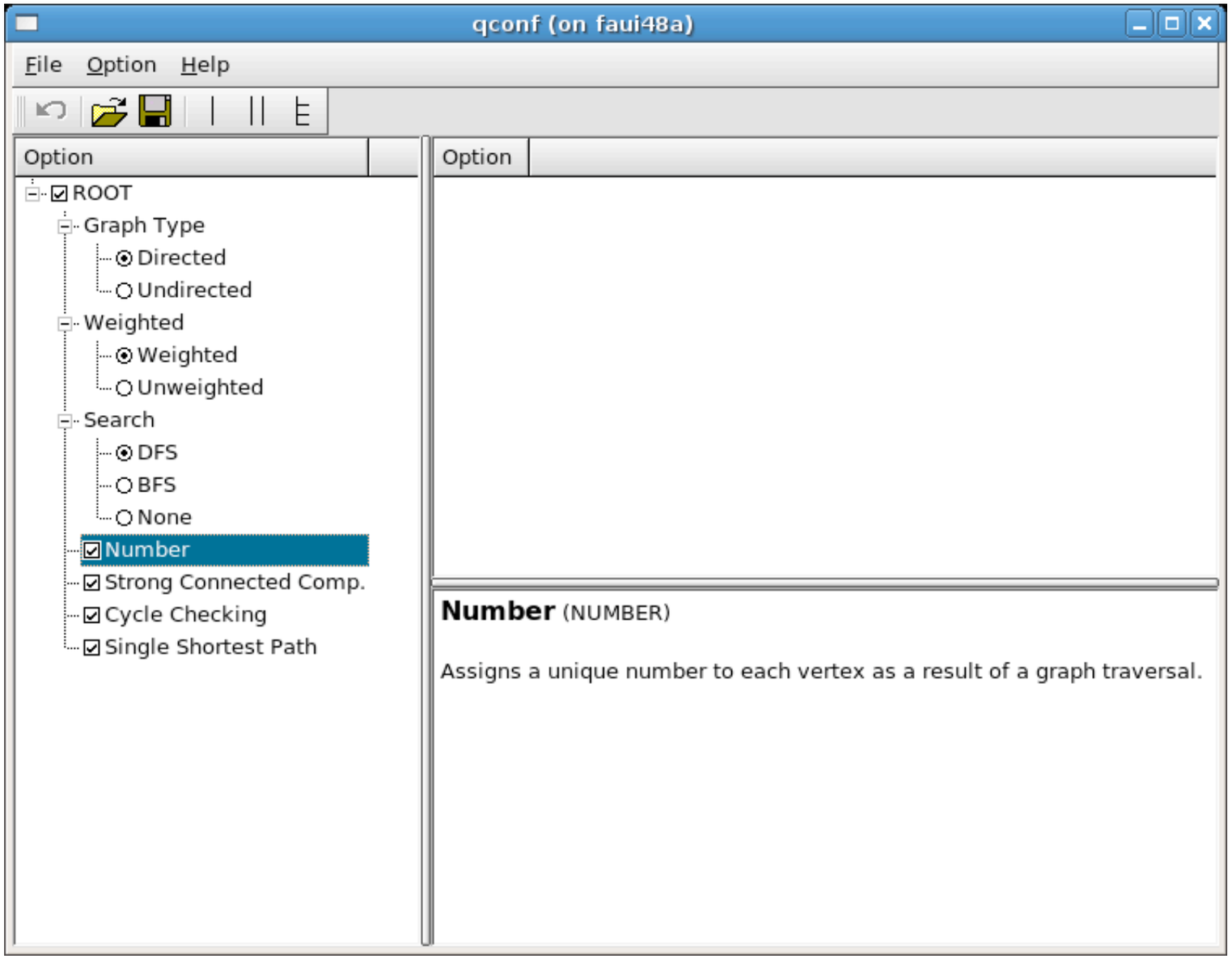
```
config 64BIT
  bool "64-bit kernel" if ARCH = "x86"
  default ARCH
  help
    Say yes to build a 64-bit kernel -
formerly known as x86_64
    Say no to build a 32-bit kernel -
formerly known as i386

config X86_32
  def_bool !64BIT

config X86_64
  def_bool 64BIT
```

LKC Language (menu options)

```
menu "Processor type and features"

source "kernel/time/Kconfig"

config SMP
  bool "Symmetric multi-processing support"
  ---help---
    This enables support for systems with more than one CPU.

...

endmenu
```

```
choice
  prompt "Subarchitecture Type"
  default X86_PC

config X86_PC
  bool "PC-compatible"
  help
    Choose this option if your computer is a standard PC or compatible.

config X86_ELAN
  bool "AMD Elan"
  depends on X86_32
  help
    Select this for an AMD Elan processor.
...
endchoice
```

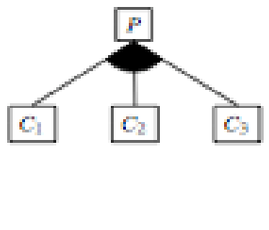
LKC Graphical User Interface

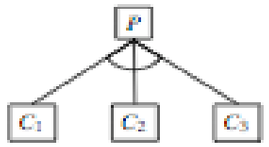


LKC for Feature Modeling

MANDATORY		config P
		  boolean "P"
		  select C
		config C
		  boolean "C"

OPTIONAL		config P
		  boolean "P"
		config C
		  depends on "P"
		  boolean "C"

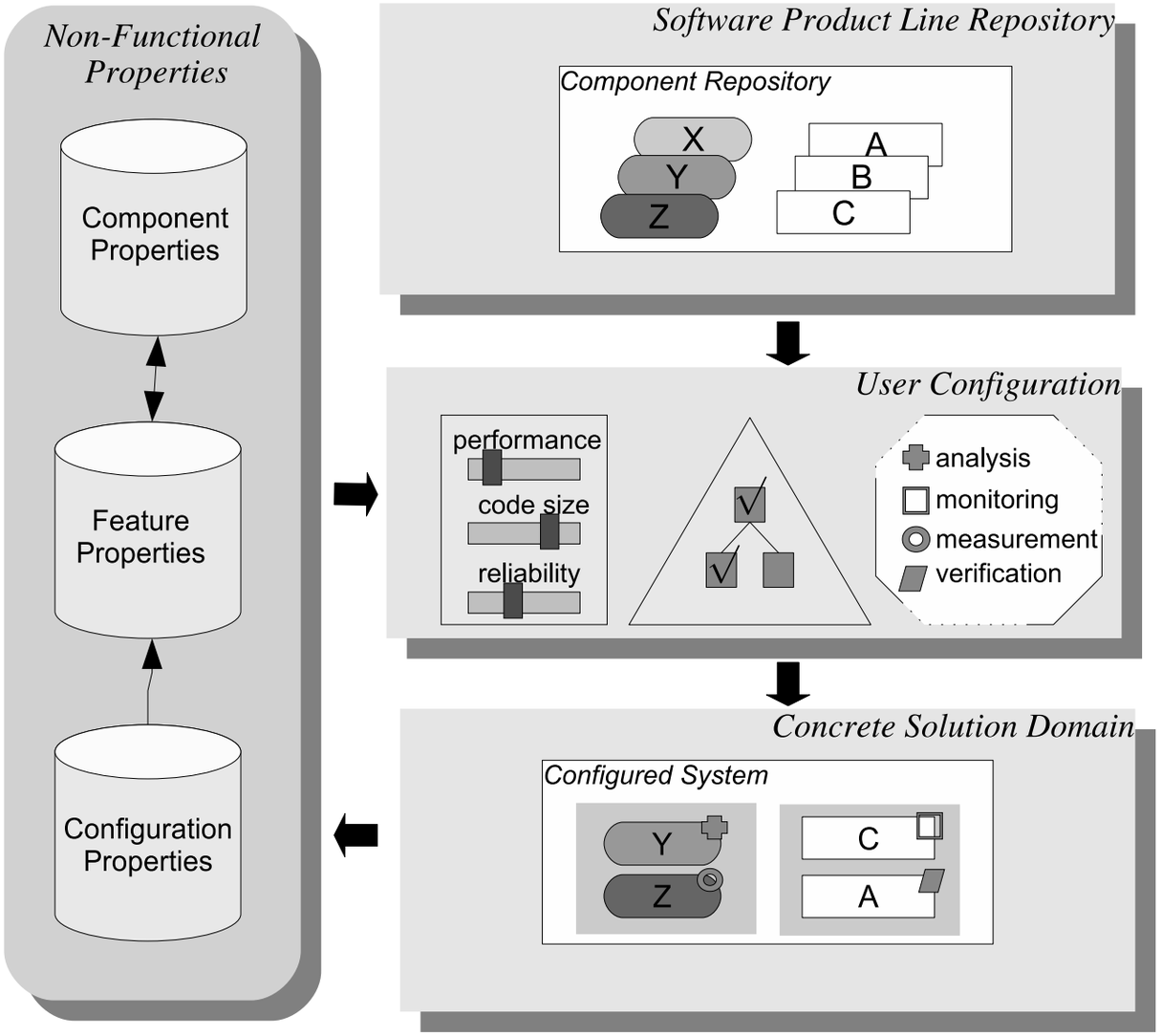
OR		menu "P"
		config P
		  boolean
		config C1
		  boolean "C1"
		  select P
		config C2
		  boolean "C2"
		  select P
		config C3
		  boolean "C3"
		  select P
		endmenu

ALTERNATIVE		choice
		  prompt "P"
		config C1
		  boolean "C1"
		config C2
		  boolean "C2"
		config C3
		  boolean "C3"
		endchoice

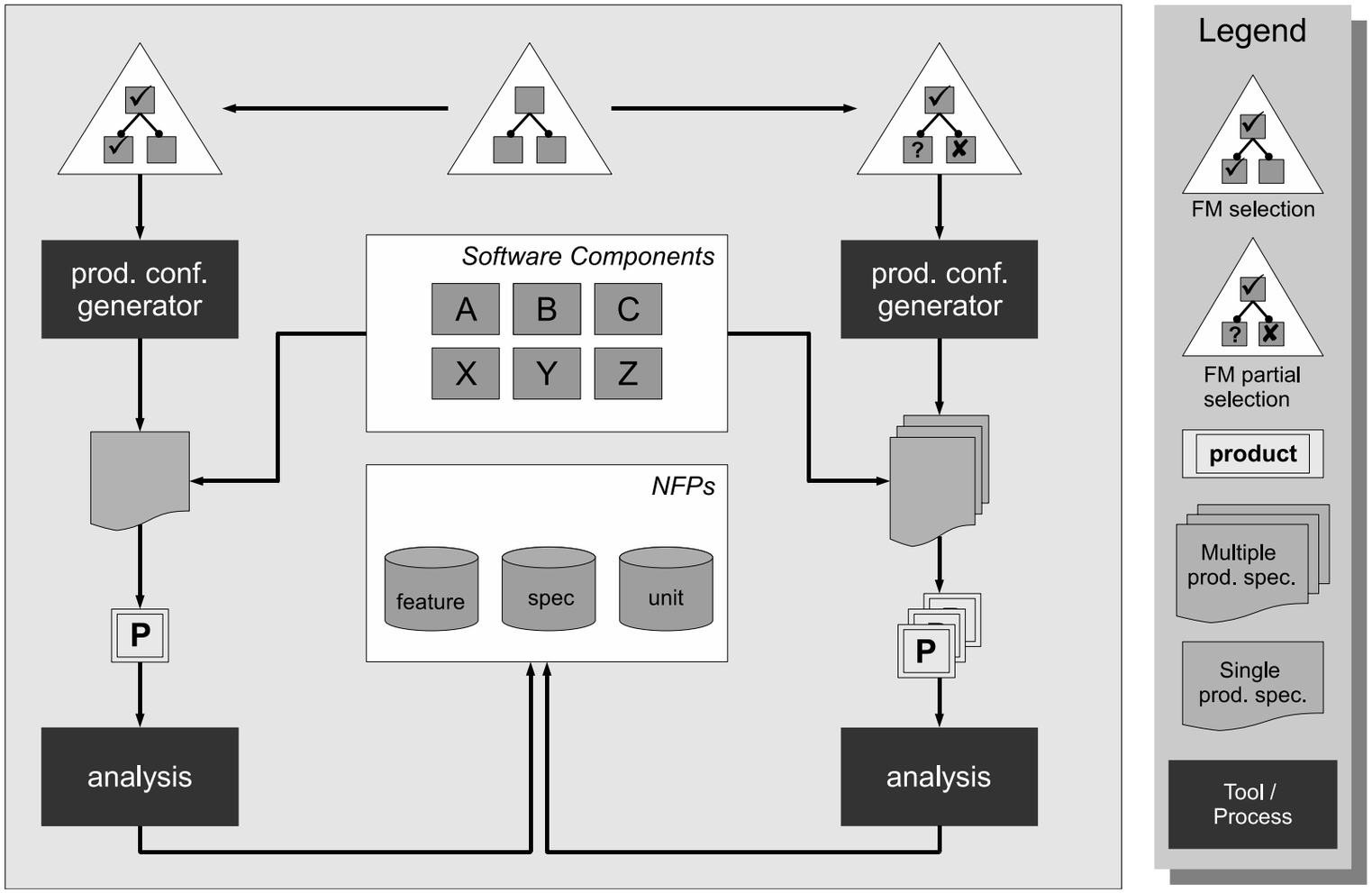
IMPLIES		config A
		  boolean "A"
		  requires B
		config B
		  boolean "B"

EXCLUDES		config A
		  boolean "A"
		  requires !B
		config B
		  boolean "B"

The *Feedback* Approach



Partial Configuration



Summary and Future Work

- Other communities are also working on *Variability Management*
- The LKC as feature modeling tool
- Integration of the LKC in our tool-chain
- New extensions to better support the *Feedback* Approach