Dedicated Operating Systems

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March 2004

Why Building new System Software after all?

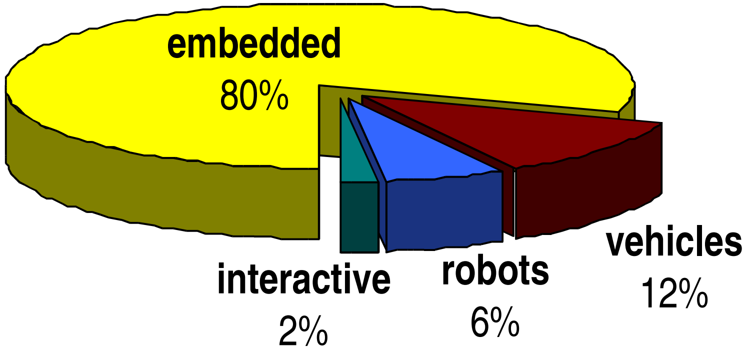
- There is Windows and there is Unix!
  - And there are plenty of unsuccessful OS stories ...
  - They are multiuser, multitask systems with nice graphical interfaces that allow us into the web ...
    - if you don't mind rebooting from time to time
  - They are almost structured programmed already!
- And there are the standards
  - Strong API's such as Posix and Win32 would not allow deep OS changes to reach applications
  - Desktop hardware seems to be fastened to the IA-32 architecture
  - As Pike said: system software research is irrelevant!

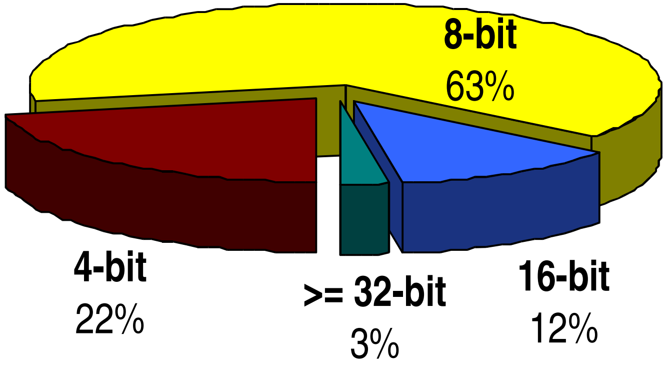
Generic X Dedicated Systems

- Generic systems
  - Must be ready for whatever application the user wants to execute
  - Comprehensive services and features
- Dedicated systems
  - Small set of (single) previously known applications
  - Specific run-time support requirements (few services)
  - Vast MAJORITY!

Where are the processors?

(Tennenhouse, CACM 43(5):44)





Challenge

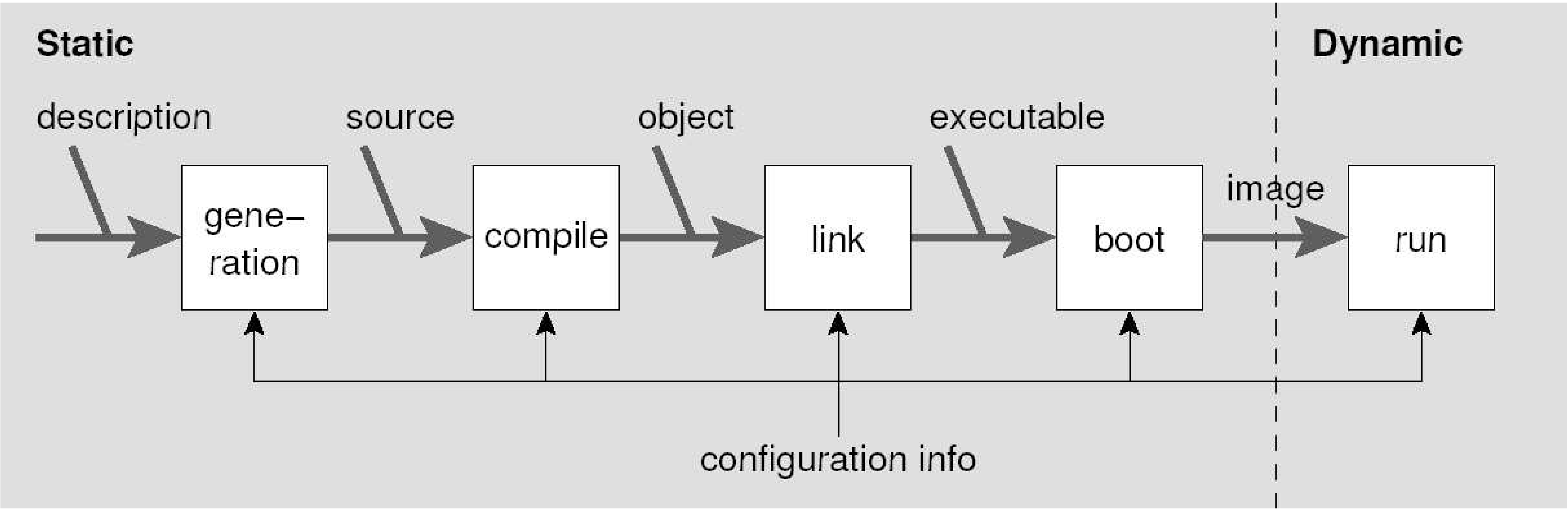
- To give each dedicated application adequate run-time support ...
  - Services that properly fulfill application's requirements
  - Delivered as required by applications
- without having to design a new system for each application ...
- without requiring application programmers to undergo complicated configuration procedures

Pursued Solution

- Domain engineering techniques
  - Family-based design
  - Collaboration-based design
  - Aspect-oriented programming
  - Object-oriented design
  - Subject-oriented programming
  - Generic programming
  - Static metaprogramming

  to produce component-based operating systems that can be (automatically) tailored according with the needs of particular applications
- A new design method emerged
  - Application-Oriented System Design

Configurability



- Static
  - Efficiency
  - Dedicated systems (known requirements)
- Dynamic
  - Extensibility
  - All-purpose systems (unknown requirements)