Title: Baumgarten: GBS (17.01.2014)
Date: Fri Jan 17 08:34:13 CET 2014
Duration: 33:58 min
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Exkurs: Operating System Structures (1)

- OS Services
  - [Sil13, Chap. 2, slide 7]
- User Interfaces (UI)
  - Command Line Shell [Sil13, Chap. 2, slide 7]
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- Beispiel: MS-DOS
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A View of Operating System Services

Bourne Shell Command Interpreter

The Mac OS X GUI

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Simple Structure

- I.e., MS-DOS – written to provide the most functionality in the least space
- Not divided into modules
- Although MS-DOS has some structure, its interfaces and levels of functionality are not well separated

Traditional UNIX System Structure

Beyond simple but not fully layered

- (the users)
- shells and command-line interpreters
- system libraries
- system-call interface to the kernel
- system interface to the hardware
- terminal controllers
- device controllers
- memory controllers
- physical memory
### iOS
- Apple mobile OS for iPhone, iPad
  - Structured on Mac OS X, added functionality
  - Does not run OS X applications natively
  - Also runs on different CPU architecture (ARM vs. Intel)
- Cocoa Touch: Objective-C API for developing apps
- Media services layer for graphics, audio, video
- Core services provides cloud computing, databases
- Core operating system, based on Mac OS X kernel

### Android
- Operating System Structures (2)
  - Geschichteter Ansatz
    - [Sil13, Chap. 2, slide 39]
  - Mikrokernansatz
    - [Sil13, Chap. 2, slide 41]
  - Mac OS X
    - [Sil13, Chap. 2, slide 45]
  - iOS
    - [Sil13, Chap. 2, slide 46]
  - Android
    - [Sil13, Chap. 2, slide 48, 47]
  - Apple Newton Message Pad
    - ((Siehe unten))
Apple Newton

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