

Welcome to



Mobile Systems Software Project Cluster

Manning of course:

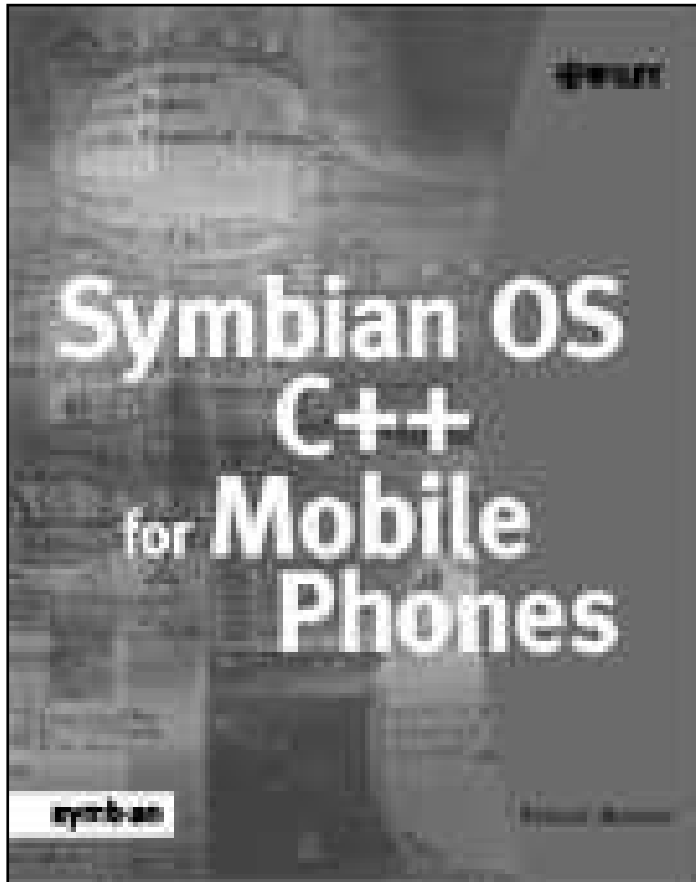
- Søren Debois (PhD Student)
- Kåre Kristoffersen (Assist. Professor)

Today:



- Litterarure and Internet ressources.
- Schedule of Activities.
- History of Symbian
- Project work.

Course Litterature



Richard Harrison:
Symbian OS C++ for
Mobile Phones

Published at Wiley

Sold by
samfundslitteratur

Supplementary Material



Nokia Mobile Developer
Series: **Developing
Series 60
Applications, A
Guide for Symbian
OS C++ Developers.**

Overview

- C++
- C++ for Symbian OS
- Project work

<http://www.itu.dk/courses/ISOM/E2005/>



Activities

- Lectures and homework (6 weeks).
- 12 week / 16-week projects, submission in May 2005.

Schedule:

1. Introduction (Today)
2. C++
3. C++
4. C++ exercise (program the core of your project here.)
5. Symbian C++ (framework, memory mgt.)
6. Symbian GUI programming
7. Symbian Exercise (port simple C++ app to the phone)
8. Remaining time: Specialize your project into a direction chosen by you.

Smartphones

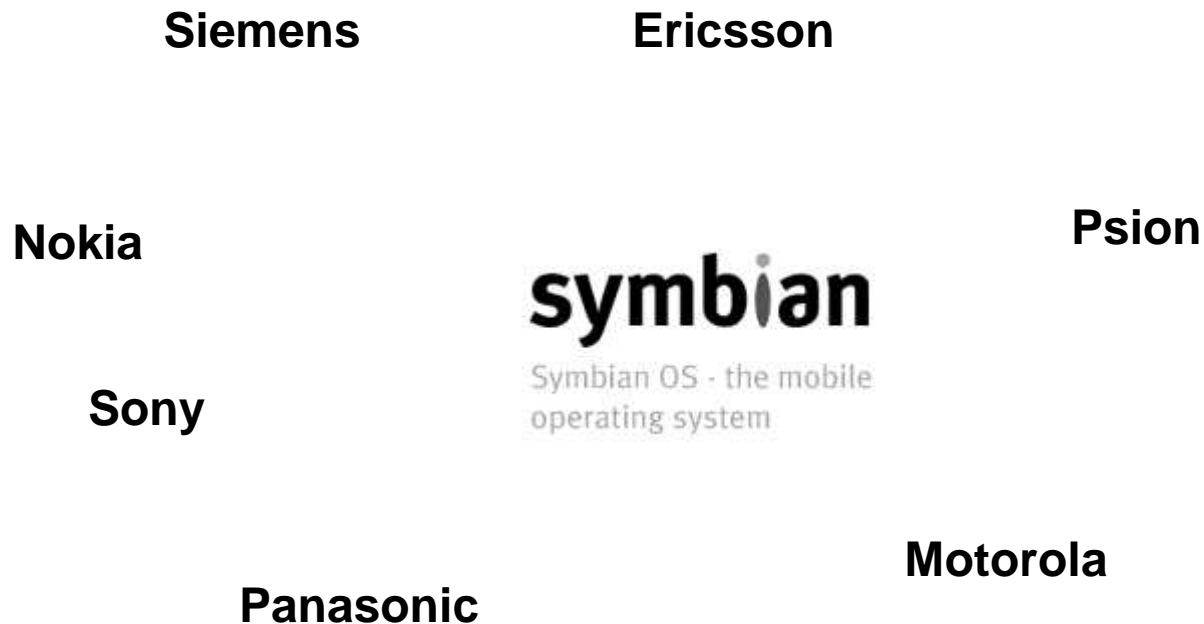


Definition: A handheld device containing **phone** as well as other means of data communication (**2.5 G or UMTS**). It should run diverse advanced **GUI** applications and it must be operatable by **one hand**.

Operating Systems in Wireless Information Devices

- Palm: Palm OS. First success in handheld devices.
- Microsoft: Windows CE.
- Symbian: Symbian, an open standard.

Symbian is the Industry Co-operation of Information Technology Companies



Symbian Mission

Symbians Mission is to:

1. Set the *standard* for mobile wireless operating systems, and
2. Enable a mass market for wireless Information Devices.
3. Symbian OS on everybody's phone.



History of Symbian

1984: Psion Organizer II (8 bit processor).

1991: Psion Series 3 (Sibo OS).

1994: Development of 32 bit OS Started.

1997: Psion Series 5 (Symbian OS).

1998: Symbian was formed.

1999: Panasonic joins Symbian as licensee.

History of Symbian (contd.)

2000:

- Sony, Sanyo, Kenwood license Symbian.
- First Symbian OS phone, Ericsson R380 smartphone.
- Symbian recognized by the UMTS forum.

Hiostory of Symbian (contd.)

2001:

Fujitsu and Siemens licenses Symbian OS.

First 2.5 G Symbian OS Phones, Nokia 7650 and 9210.

2002:

Samsung licenses Symbian OS.

Sony Ericsson announces P8000.



Rapid Development

April 2002: 4 products in market + 18 products in development.

June 2004: 23 products in market + 34 products in development.

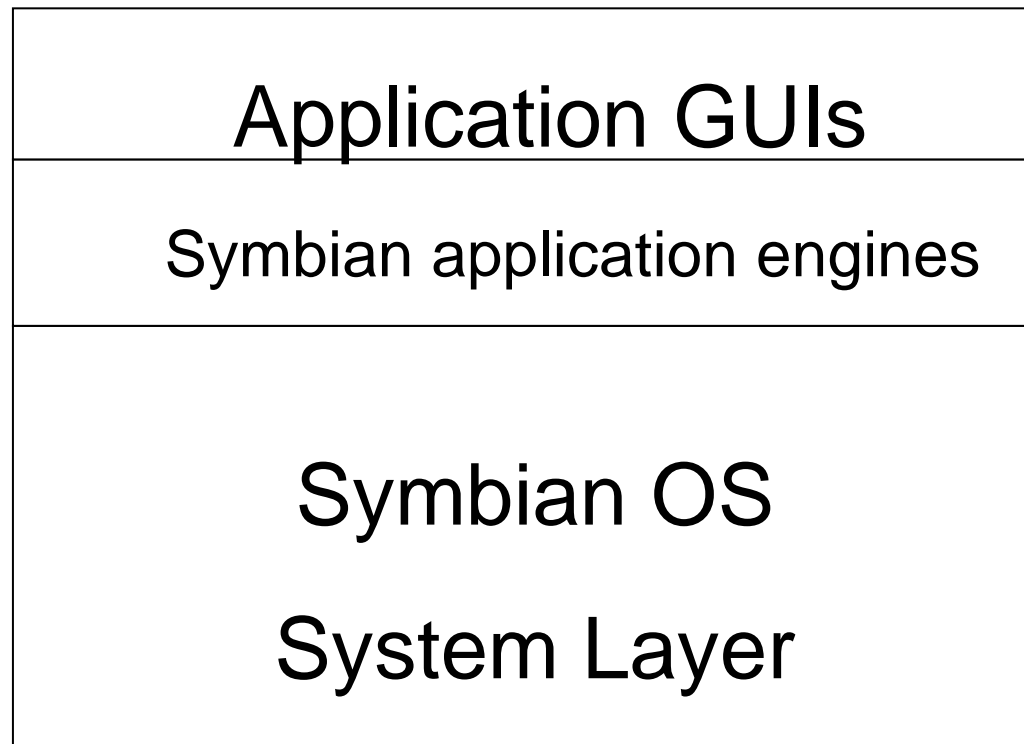
Symbian shareholders now make over 70% of the phones sold globally.

Symbian OS Overview

- Highly optimized, pre-emptive multitasking operating system:
 - upgraded in 1994 to a 32 bit OS.
 - 95 % written in C++, some C and assembler.
 - client/server architecture.
- More than just an OS
 - Class Framework
 - Suite of PIM applications, email, browsers, etc.
(personal information management)



The Symbian Platform



Symbian OS in general

Symbian OS includes a robust multi-tasking kernel, integrated telephony support, communications protocols, data management, advanced graphics support, a low-level graphical user interface framework and a variety of application engines.

Symbian OS is:

- Efficient. Designed for 32-bit CPUs
- Fit for purpose, designed for data-enabled mobile phones.
- Compact
- Multitasking
- Well-architected, customisable and configurable. Written in object-oriented C++.
- Optimized for battery powered equipment
- Robust and reliable.

The OS and critical applications may run for up to several years without ever being closed or reset. One important factor is resource management.

Differences between Symbian OS- and PC-devices

The main things, that should be noticed when programming with Symbian OS, are:

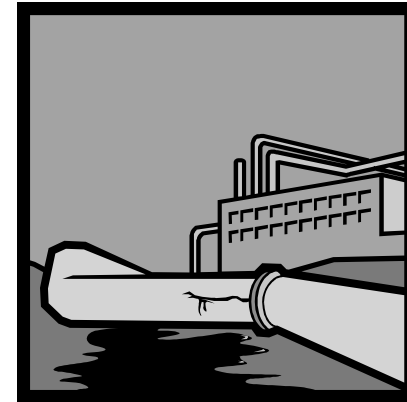
Resources are constrained: The CPU is slower and there is less memory.

Power management is critical: user data is often held on RAM disk, so power must never be lost, even when the machine is switched off, or when the batteries are replaced. Data and machine state must be maintained in low-power conditions.

The **software** has to be compact. Errors, like out-of-memory, have to be checked. The user interface doesn't have a Desktop.

Memory Leak:

Memory dynamically allocated on the heap that is not released correctly.



☺ Symbian introduces a Programming style and some mechanisms that helps avoiding memory leaks

C++

You will learn to read and understand C++ programs as well as writing C++ programs your self.

You will learn to program Symbian C++.

C++ example – a Stack



```
• #include <iostream>
• #define SIZE 100

• class stack {
•     int stck[SIZE];
•     int tos;
• public:
•     stack(); //constructor
•     ~stack(); // destructor
•     void push(int i);
•     int pop();
• };

• // stack's constructor function
• stack::stack()
• {
•     tos=0;
•     std::cout << "stack initialized\n";
• }

• // stack's destructor function
• stack::~stack()
• {
•     std::cout << "stack destroyed\n";
• }
```

```
• void stack::push(int i)
• {
•     if(tos==SIZE){
•         std::cout << "stack is full\n";
•         return;
•     }
•     stck[tos] = i;
•     tos++;
• }

• int stack::pop()
• {
•     if(tos==0){
•         std::cout << "stack underflow\n";
•         return 0;
•     }
•     tos--;
•     return stck[tos];
• }
```

```
int main( void)
{
    stack a,b; //create two stack objects
    a.push(1);
    b.push(2);

    a.push(3);
    b.push(4);

    std::cout <<a.pop()<< " ";
    std::cout <<a.pop()<< " ";
    std::cout <<b.pop()<< " ";
    std::cout <<b.pop()<< "\n";
}
```

What is needed to Code?

- An Integrated Development Environment (IDE) for C++
 - Metrowerks Codewarrior (30 licenses at ITU)
 - Visual C++ available at ITU.
 - Borland C++ Mobile Edition for free.
- A Software Development Kit (SDK).
 - Free from symbian.com/developer
 - (also installed in our exercise labs!)

SDK = Software Development Kit

- Series 60 Application Programming Interfaces
- Software Libraries containing programming APIs
- Series 60 emulators for testing and debugging.
- Symbian specific developer tools (building, installation,...)
- HTML Docs
- Application GUI Wizards.
- Example Applications
- PC Hosted C++ compiler for target devices.

C++ Ressources

C++ overview for Java Programmers:

http://www-instruct.nmu.edu/math_cs/tseethof/cprimer/book_of_c.htm

Homepage of the creator Bjarne Stroustrup:

<http://www.research.att.com/~bs/C++.html>

The Emulator:

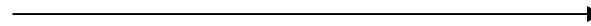


- To test and debug application on PC before installation on device.
- IDE specific.

Installing Applications



application.sis



1. Develop application on PC, and test in emulator on PC.

2. Compile for target platform (ARM).

3. Download SIS file to Phone using Bluetooth

4. Run application on Phone

Symbian Communities

www.symbian.com/developer

To find SDK's

forum.nokia.com/symbian

For discussions and experiences

You choose your own project

- Focus on software concepts and architecture or
- Focus on learning C++ or
- Develop a fancy game
- Client server application.
- P2P application.
- Something different...

All (Symbian) Phones must be switched off during the lecture 😊



Exercise I: Questionnaire

1. What is your educational background?
2. What is your job now (student/IT Worker/other) ?
3. Why did you choose this course?
4. What is your C++ knowledge (0-100%)?
5. What is your Java knowledge (0-100%)?
6. What do you expect to learn in this course?
7. Do you already have experience with Symbian development? If yes, what?
8. In what way can you contribute to making this a successful course?
9. Do you have a cell phone?
10. Is it a Symbian Phone?



Exercise II

Check out:

1. www.symbian.com/developer, and
2. www.newlc.com

Exercise III

- What kind of project would you like to work with?