Palestine Polytechnic University

College of Engineering & Technology
Electrical & Computer Engineering Department

Graduation Project Introduction

Mobile application development

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جامعة بوليتكنك فلسطين
الخليل – فلسطين
كلية الهندسة و التكنولوجيا
دائرة الهندسة الكهربائية و الحاسوب

اسم المشروع:

Mobile application development

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بناء على نظام كلية الهندسة و التكنولوجيا و إشراف و متابعة المشرف المباشر على المشروع وموافقة أعضاء اللجنة الممتحنة تم تقديم هذا المشروع إلى دائرة الهندسة الكهربائية و الحاسوب وذلك للوفاء بمتطلبات درجة البكالوريوس في الهندسة تخصص هندسة أنظمة الحاسوب.

توقيع المشرف

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توقيع اللجنة الممتحنة

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توقيع رئيس الدائرة

....

Dedication

To Our Parents, Families
To all whom help us at this project
To Uncle Ahmad (Abo Anas) for his great help
To our Friends who have help and support us.

ACKNOWLEDGMENT

Our appreciation to:

Palestine Polytechnic University

College of Engineering & Technology
Electrical & Computer Engineering Department

Our supervisor: Dr Rudwan Tahboub *for his great help and supports*

ABSTRACT

The object of this project is to increase the performance of the mobile when the user run an application or a program , this will be done by using task manger to check processes run on CPU ,determine which processes are not important and terminate them.

Also we apply windowing technique which deal with mobile internet browser to increase its performance .

CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE 1

Introduction

1.1 Main Idea Of The Project

1.2 Project Objective

1.3 Time Plane

1.4 Project Risk Management

1.5 Cost Estimation

1.6 System Requirements

1.7 Report Contents

1.1 Main Idea Of The Project

Nowadays Mobile devices are available to users than ever before, and each Mobile has several applications and programs, so users have a problem with the low performance of the mobile that affect programs and applications .

In our project the idea will be a developing process for mobile applications and programs such as mobile game and internet browser to improve mobile performance.

So we going to exploit the main component of the mobile such as CPU and RAM to provide the largest possible efficiency of the applications on a mobile phone.

In order to achieve the project goal, several components within a mobile should be studied such as CPU ,RAM ,power supply which the most important parts in the mobile that affect the performance of mobile applications and programs .

The main limitations of mobile devices are : small display, relatively low performance of the CPU and problematic control (especially if the device lacks a touch-screen) . When designing mobile applications, one needs to consider these limitations and design them so that they offers intuitive and easy-to-use user interface and reasonable performance even on the less powerful mobile devices . The simplest way of achieving this is to use specialized components .

Figure 1.1:Example of Mobile application

1.2 Project Objectives

This project aims to achieve some objectives such as:

- Exploit mobile CPU as much as we can to improve the performance of mobile process in applications .
- Exploit mobile RAM as much as we can to improve the performance of mobile applications .
- Reduce the power dissipation when run more than application at the same time .
- Improve resolution of image display and its quality when run an applications .

1.3 Time Plane

Table 1.1: Time plane

Week Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Choose the project idea				■	■												
Gathering information						■	■	■	■								
Data analysis								■	■	■							
Design Options										■	■	■					
Documentation								■	■	■	■	■	■	■	■	■	■

Week Task	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Rewrite introduction report	■	■															
Learn and Write Program code in J2ME		■	■	■	■												
Write program code in C#					■	■	■	■	■	■	■						
Documentation									■	■	■	■	■	■	■	■	■

1.4 Project Risk Management

There are some possible risks that may occur in our project within hardware part or software part. Here is some of those risks and how to manage them.

Technology risks:

- Some risks may occur because of software and hardware used in the system.

Hardware risks:

- Mobile failure .

Software risks:

- The software is not compatible with the mobile version.
- Problems that may occur with using the software development environment.

People risks:

- Member of team get ill.
- Member of the team becomes unavailable for any reason.
- supervisor of the team becomes unavailable for any reason.

Organizational risks:

- Facing project resources problem.

Tools risks:

- Losing of any supported software or hardware that used to develop the system.

Requirements risks:

- Risks may occur by change software programs that will make major changes in applications run ..

Risk avoidance:

The following strategies will be taken to avoid risks mentioned above:

- We must take care when we deal with the hardware (mobile) and use them according to their specifications.
- We must take care when we deal with the software and use an original programs.
- Good estimation and usage of the projects budget and resources.
- Good estimation of system requirements.

Risk management:

Risk management will be as follows:

- Software development environment risks will be handled by the backup of software.
- People risks are handled by using work load balancing on member especially when a member can't perform some of his tasks, then it will be done by other member .

1.5 Cost Estimation

Table 1.2: Cost Estimation

Number	Object	Cost for students ($)	Commercial Cost ($)
1	Mobile phone (N96)	320 $	320 $
2	Visual Studio 2008 professional edition (complete package)	0.00 $	615-799
3	Adobe Dreamweaver CS4	0.00 $	350$
4	XAMPP Control Panel	0.00$	0.00$
5	PC suite	0.00$	0.00$
6	Hosting server	9.00$	15.00$

1.6 System Requirements

This section lists the main requirement that must be met in project, in order to set the main services that will be provided.

1.6.1 Functional Requirements:

- Mobile CPU must be Exploit as much as possible .
- Mobile RAM must be Exploit as much as possible .
- Power dissipation must be less as much as possible.
- Screen resolution must be suitable for human eyes as much as possible .

1.6.2 Nonfunctional Requirements

1- Reliability:

Software code will be accurate, reliable, fault tolerant.

2- Performance:

The application must be fast reaction and with high performance when run.

1.7 Report Contents

The documentation for the project is divided into seven chapters, each chapter concerns to dedicated point of the system. The following explain the content of each chapter.

Chapter 1: Introduction

The first chapter provides a general overview of the project, project objectives, an overview, time schedule, the estimated budget, project risks, and the management plan are all listed.

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Chapter 2: Theoretical Background

The second chapter explored the theoretical background related to the main idea of the project, mobile architecture and its main components, and software component of this project.

Chapter 3: Project Conceptual Design

This chapter describes project objectives in greater detail. The overall system design options, as well as its components are discussed, as well as the general block diagram.

Chapter 4: Detailed Technical Project Design

In this chapter, we will provide a detailed description about the different project phases, subsystems schematics and design, and schematics for overall system design.

Chapter 5: Software System Design

This chapter talks about the implementing the system from the programming point of view. This will include the classes and methods that are used in the program and the flow chart that explain the sequence of the project.

Chapter 6: System Implementing and Testing

This chapter discusses the actual implementation of the project, and the various testing stages of the integrated system.

Chapter 7: Conclusion and Future Work

In this chapter we list conclusions of the project, it also put some related future work to improve the results we achieve.

CHAPTER TWO

2

Theoretical Background

2.1 Overview

This chapter describe mobile architecture and the general Basic elements in the mobile device : Central Processing Unit (CPU) , Random Access Memory (RAM) , Power dissipation and Screen display which will be examined in this project, and gives brief descriptions about them .

A Description of mobile performance elements which used to increase the performance of the mobile when a user run an application or game are list here.

Mention the common types of CPU which used in mobile devices , list its families, and explaining them briefly.

Talk about Nokia N96 mobile which we use in our project ; describe its internal structure processor .

.

2.2 Mobile Architecture

The number and variety of mobile devices has increased steadily in the last ten years. Cellular telephones, first introduced in the 1980s, have achieved a penetration rate of almost 70% in some countries and are certainly the main factor behind the current explosion in the use of mobile devices [1]

Although there is by now a real zoo of mobile devices, with species and subspecies of them, there are three main features common to most of them:

- Mobile devices provide wireless communication to a base station (a personal computer, or a whole telephone, or data network).
- Mobile devices must be small to be portable.
- Mobile devices must remain operational for several hours or days without a battery recharge.

Two main factors have fueled the steady growth in sales of mobile :
a) the reduction of the footprint of the mobiles themselves, such as cellular .
b) the success in developing low-power hardware which allows the devices to operate autonomously for hours or even days[1].

Mobile hardware architecting applications is difficult. Part of the problem is that while there are many adhoc application architectures, there is very little agreed upon generic architectures for the analysis and modeling of complex, This is about to change. Software architectures are now emerging as an important software engineering discipline, where the goal is to carefully devise frameworks that capture the essence of an application domain[1].

2.3 Mobile Basic Element

2.3.1 Central Processing Unit (CPU):

CPU, otherwise known as a processor the first essential element on the mobile, it is an electronic circuit that can execute computer programs. Both the miniaturization and standardization of CPUs have increased their presence far beyond the limited application of dedicated computing machines. Modern microprocessors appear in everything from automobiles to mobile phones. [4].

2.3.1.1 Clock rate:

The clock rate is one of the main characteristics of the CPU when performance is concerned. Clock rate is the fundamental rate in cycles per second (measured in hertz) for the frequency of the clock in any synchronous circuit. A single clock cycle (typically shorter than a nanosecond in modern non-embedded microprocessors) toggles between a logical zero and a logical one state.

With any particular CPU, replacing the crystal with another crystal that oscillates with twice the frequency will generally make the CPU run with twice the performance. It will also make the CPU produce roughly twice the amount of waste heat [4].

Useful of clock rate

The clock rate of a processor is only useful for providing comparisons between computer chips in the same processor family and generation. Clock rates can be very misleading since the amount of work on different computer chips can do in one cycle varies. Clock rates should not be used when comparing different computers or different processor families. Rather, some kind of software benchmarks should be used.

Engineers are working hard to push the boundaries of the current architectures and are constantly searching for new ways to design CPUs that tick a little quicker or use slightly less energy per clock. This produces new cooler CPUs that can run at higher clock rates.

Scientists also continue to search for new designs that allow CPUs to run at the same or at a lower clock rate as older CPUs, but which get more instructions completed per clock cycle [4].

2.3.1.2 Common Types Of CPU :

There are many types of mobile CPU, the most common is:

2.3.1.2.1 ARM Family:

The ARM was known as the Advanced Reduced Instruction Set Computer (RISC) Machine, this processor architecture provides support for the 32-bit ARM and 16-bit Thumb® Instruction Set Architectures (ISAs) along with architecture extensions to provide support for Java acceleration (Jazelle™), security (TrustZone™), SIMD, and NEON™ technologies.

The ARM ISA is constantly improving to meet the increasing demands of leading edge applications developers, while retaining the backwards compatibility necessary to protect investment in software development.

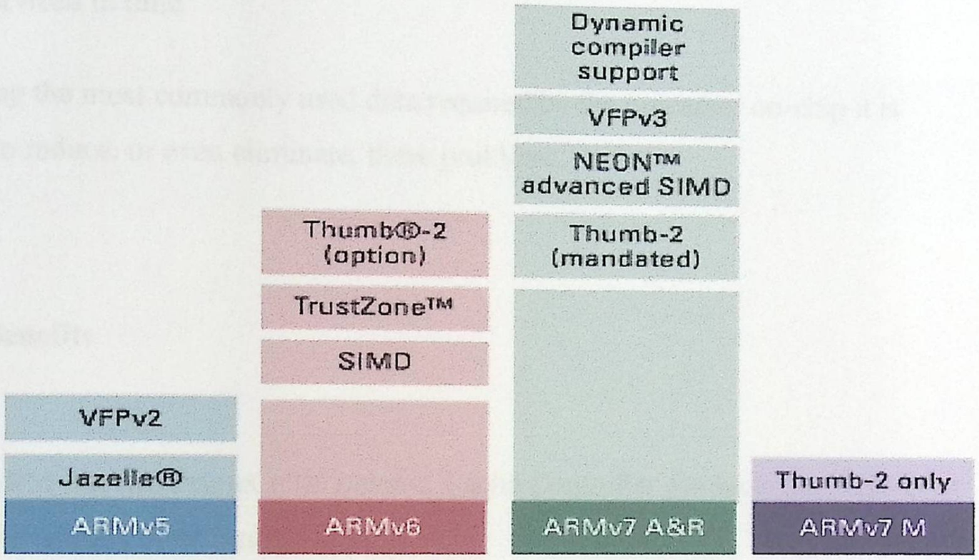


Figure 2.1 ARM Family

Examples of ARM family are (ARMv4, ARMv4T, ARMv5TE. ARMv5TEJ, ARMv6 ,ARMv7, ARM920T and ARM922T), Figure 2.1 show some of them.

And the other kinds of family processor are INTEL XScale Family which contains these types PXA (PXA210/PXA25x, PXA26x, PXA27x, PXA3xx Monahans, PXA90x), IXC, IOP, IXP network processor, CE.

2.3.2 RAM:

2.3.2 .1 Overview

The increase in performance in ARM processors has not been matched by the more modest performance increase in external memory devices. This can cause significant performance issues in applications, result in designs being limited by off-chip memory accesses and may even lead to system failures if critical memory accesses are not serviced in time.

By keeping the most commonly used data required by the processor on-chip it is possible to reduce, or even eliminate, these problems.

2.3.2 .2 Benefits

ARM has two PrimeCell® Level-2 Cache Controller products that have been designed to address these issues.

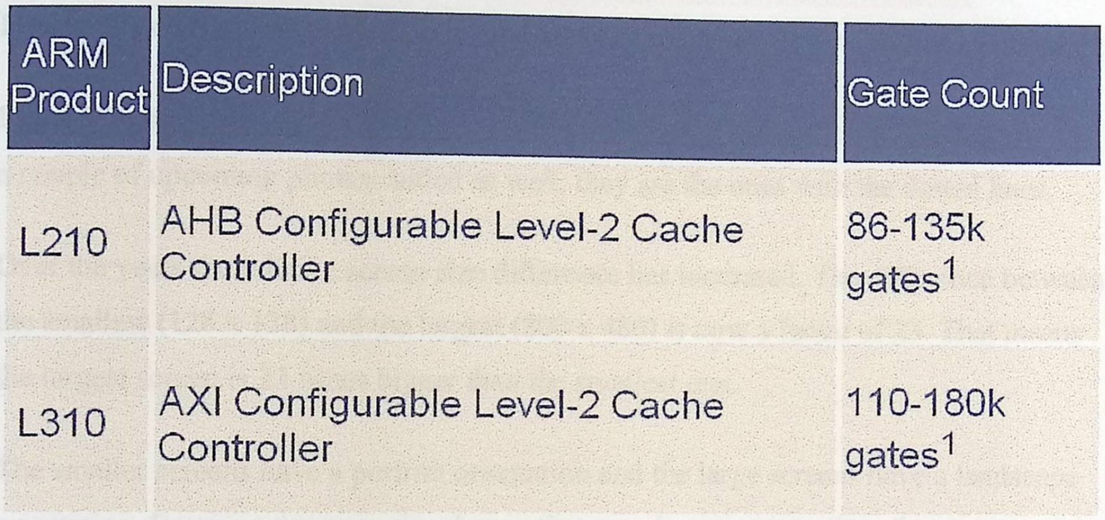
These controllers sit on-chip between the processor and memory controller and enable reused data to be supplied quickly to the processor and therefore eliminate the need to make costly external memory accesses. This can even help to reduce overall power consumption by minimizing relatively high power external memory accesses.

As an additional benefit, the number of transactions generated by the processor on the AMBA® interconnect will be reduced by using a Level-2 cache controller thereby freeing the interconnect to be used by other on-chip devices.

As would be expected from PrimeCell Peripherals these products are designed and validated to the highest of standards, support the broadest range of industry tools and offer excellent value for money.

2.3.2 .3 Portfolio

The PrimeCell Level-2 Cache Controllers are implemented to be compatible with all Processors using either the AMBA AXITM or AHBTM protocols. The controllers can also be used to enable a simple 'drop-in' speed-up option to already architected systems struggling to meet system performance requirements, figure 2.2 shows two mean L2 controller.



ARM Product	Description	Gate Count
L210	AHB Configurable Level-2 Cache Controller	86-135k gates[1]
L310	AXI Configurable Level-2 Cache Controller	110-180k gates[1]

Figure 2.2 Prime Cell Level-2 Cache Controllers (L210 , L310) .

1 - Gate counts for configurable Prime Cells show a range of typical, usable configurations

2.3.3 Screen display:

2.3.3.1 Mobile screen size trends

There is lot of work into the device database which gives opportunity to take a closer look at screen size trends. The data covered here about 400 different device models sold from 2005 to the last of 2008. This data is constructed by mBricks colleagues[2].

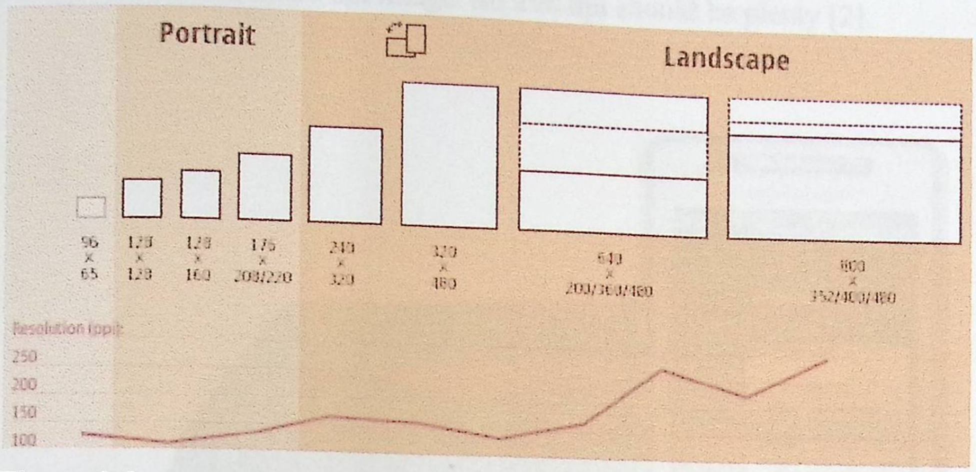


Figure 2.3 screen size of mobile device models sold from 2005 to the last of 2008 [2]

Fiqure2.3 shows the most significant screen sizes, from the smallest to the largest, a couple of upcoming phones added as well, they are the ones with the dotted lines.

Over the years the relative screen size difference has increased. The difference between the smallest (128 x 128) and the largest (800 x 480) is now a factor of 23. That means the largest screen is 23 times bigger than the smallest one.

The smaller screens have a portrait orientation and the large screens have a landscape orientation. Between them are the phones that can change orientation, they can work in both landscape and portrait. 240 x 320 is the dominant screen size overall [2].

2.3.3.2 Resolution:

A rough dpi (Dot Per Inch) calculation for some popular phone models is done. The pixel density actually increases when the pixel count increases. The screens are not only getting bigger, they are getting sharper at the same time.

There is an upper limit to what dpi is meaningful. At a certain density, the eye can no longer see any difference. If the specs are correct, the upcoming Sony Ericsson Xperia X1 (shown in figure2.4) will have a pixel density of 298. That is the highest density seen on a mobile phone yet. The human eye can resolve about 340 dpi at one foot viewing distance IIRC, but tests show that most people don't see much difference between a 150 and a 300 dpi image. So 298 dpi should be plenty [2].

Figure 2.4 Sony Ericsson Xperia X1

For LCD screens, increased pixel density doesn't give us more brightness. More brightness makes the screen easier to read outdoors and is more important than resolution from a usability perspective. Organic Light-Emitting Diode (OLED) displays will help with this

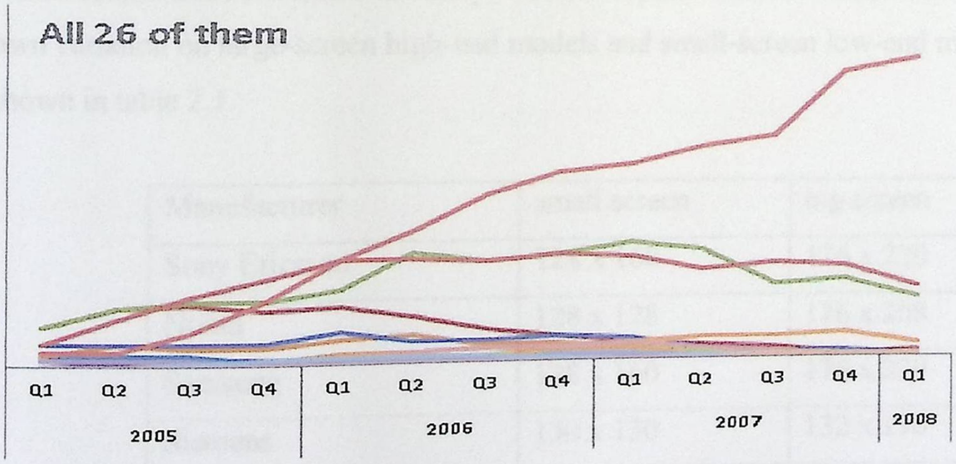


Figure 2.5 mobile resolution of 26 mobile type from 2005-2008

Figure 2.5 show a grand total of 26 different screen sizes. Counted phones that had a color screen, ran Java and had a browser. Figure 2.6 Just a handful of variants makes up the majority of phones. Let's take a look at them:

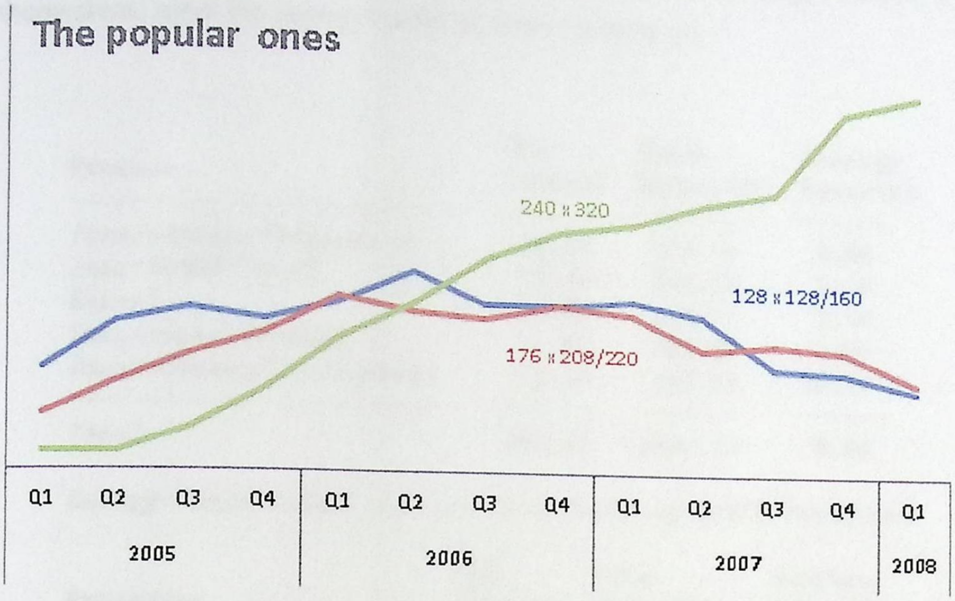


Figure 2.6 popular mobile resolution from 2005-2008

It is obvious that 240 x 320 (also called Quarter Video Graphics Array QVGA) is on a roll. It is by far the most common and it is growing rapidly. If you develop, this should be your target screen size[2].

Phone screen sizes has had a tendency to come in pairs. Each manufacturer had their own variation on large-screen high-end models and small-screen low-end models, this is shown in table 2.1.

Manufacturer	small screen	big screen
Sony Ericsson	128 x 160	176 x 220
Nokia	128 x 128	176 x 208
Samsung	128 x 160	176 x 220
Siemens	130 x 130	132 x 176

Table 2.1 Small screen and big screen size for some manufactures

2.3.4 Power Supply:

Energy is a vital resource for mobile computing. There is growing consensus that advances in battery technology and low-power circuit design cannot, by themselves, meet the energy needs of future mobile [2]

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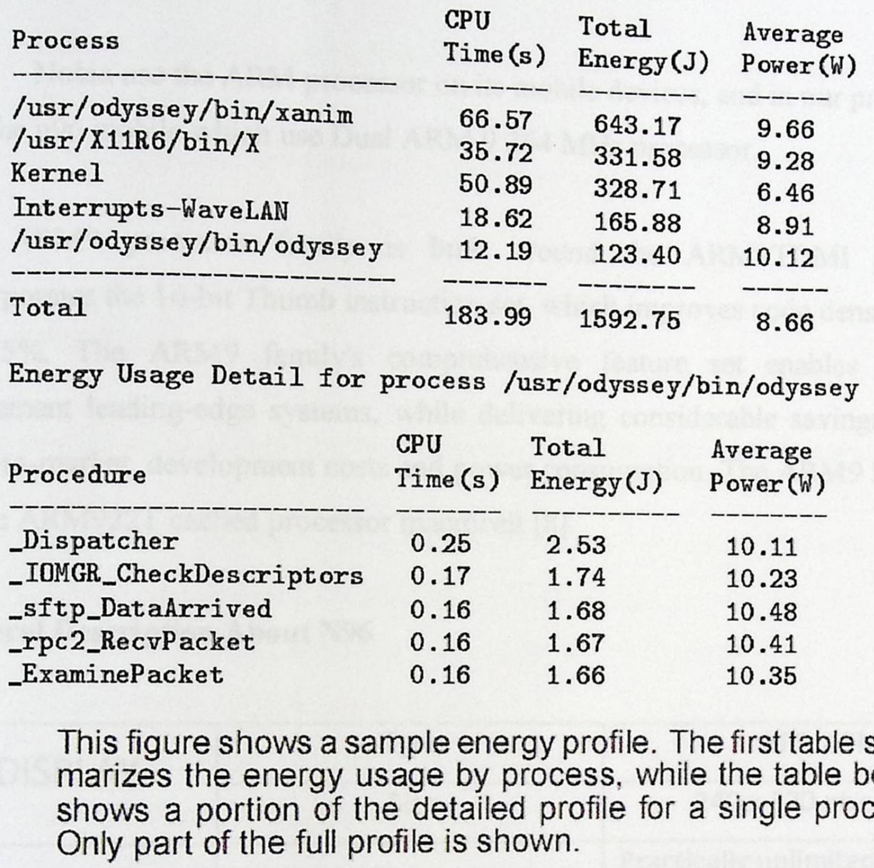


```
                                   CPU       Total       Average
Process                            Time(s)   Energy(J)   Power(W)
---------------------------------
/usr/odyssey/bin/xanim              66.57     643.17       9.66
/usr/X11R6/bin/X                    35.72     331.58       9.28
Kernel                              50.89     328.71       6.46
Interrupts-WaveLAN                  18.62     165.88       8.91
/usr/odyssey/bin/odyssey            12.19     123.40      10.12
---------------------------------  -------   --------    ------
Total                              183.99    1592.75       8.66

Energy Usage Detail for process /usr/odyssey/bin/odyssey

                                 CPU       Total       Average
Procedure                        Time(s)   Energy(J)   Power(W)
-------------------------------------------------------------------
 _Dispatcher                      0.25       2.53       10.11
 _IOMGR_CheckDescriptors          0.17       1.74       10.23
 _sftp_DataArrived                0.16       1.68       10.48
 _rpc2_RecvPacket                 0.16       1.67       10.41
 _ExaminePacket                   0.16       1.66       10.35
```

This figure shows a sample energy profile. The first table summarizes the energy usage by process, while the table below shows a portion of the detailed profile for a single process. Only part of the full profile is shown.

Figure 2.7 Example of an energy profile [2]

The two most important features of a mobile device related to power are:

a) real-time responsiveness.

b) low-power operation.

A mobile device processing signals must never stop when reproducing audio, and must show images at a constant rate. Consumers are very sensitive to such issues.

Real time responsiveness means that the mobile device must contain a number-cruncher, a DSP or an enhanced DSP hybrid chip. Low-power is also crucial. Battery life must be long so that the devices are truly mobile [2] .

2.4 Nokia N96 Processor

Nokia use the ARM processor on its mobile devices, and in our project we will use the n96 mobile which use Dual ARM 9 264 MHz processor.

The ARM9 processor family is built around the ARM9TDMI processor and incorporates the 16-bit Thumb instruction set, which improves code density by as much as 35%. The ARM9 family's comprehensive feature set enables developers to implement leading-edge systems, while delivering considerable savings in chip area, time-to-market, development costs and power consumption. The ARM9 family consists of the ARM922T cached processor macrocell [8].

General Description About N96

DISPLAY	Type	TFT, 16M colors
	Size	240 x 320 pixels, 2.8 inches
MEMORY	Phonebook	Practically unlimited entries and fields, Photocall
	Call records	Detailed, max 30 days
	Internal	16 GB storage, 128 MB RAM
	Card slot	microSD, up to 8GB, buy memory - Accelerometer sensor for auto-rotate

Table 2.2 main elements description for N96 mobile

Applications [8]

- Next-generation hand-held products
  – Videophones, portable communicators, PDAs
- Digital consumer products
  – Set-top boxes, home gateways, games consoles, MP3 audio, MPEG4 video
- Imaging
  – Desktop printers, still picture cameras, digital video cameras
- Automotive
  – Telematic and infotainment systems.

ARM922 Features

Nokia n96 used ARM922 processor which has the following feature [8] :

- 32-bit RISC processor with ARM® and Thumb® instruction sets
- 5-stage integer pipeline achieves 1.1 MIPS/MHz
- Up to 300 MIPS (Dhrystone 2.1) in a typical 0.13μm process
- Single 32-bit AMBA bus interface
- MMU supporting Windows CE, Symbian OS, Linux, Palm OS (and)
- Integrated instruction and data caches
- Excellent debug support for SoC designers, including ETM interface
- 8-entry write buffer — avoids stalling the processor when writes to external memory are performed
- Portable to latest 0.18μm, 0.15μm, 0.13μm silicon processes.

ARM9 architecture used in Nokia N96:

1- ARM922T

High performance and low power platform OS

The ARM922T hard macrocell (shown in figure 2.8)is suitable for a wide range of platform OS based applications. Based around the high performance ARM9TDMI 32-bit RISC CPU, the ARM922T features instruction and data caches (8K/8K) , memory management unit (MMU) enabling support for all major operating systems (OS), AMBA® bus-compliant interfaces, and support for ARM's real-time trace technology with the optional ETM9 **Core**Embedded Trace Macrocell™ [9]

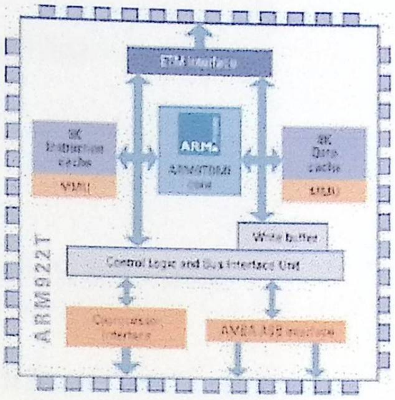


Figure 2.8 ARM9TDMI

The ARM922T processor is available via the ARM Foundry Program.

Applications:

- Hand-held products such as smart phones, communicators & PDA's
- 3G baseband and applications processor
- Digital still camera
- Consumer audio & video products
- Automotive infotainment
- Set-top box .

Features:

- 32/16-bit RISC architecture (ARMv4T)
- 32-bit ARM instruction set for maximum performance and flexibility
- 16-bit Thumb instruction set for increased code density
- MMU which supports operating systems including Symbian OS, Windows CE, Linux & Palm OS
- Instruction and data caches: 8K/8K

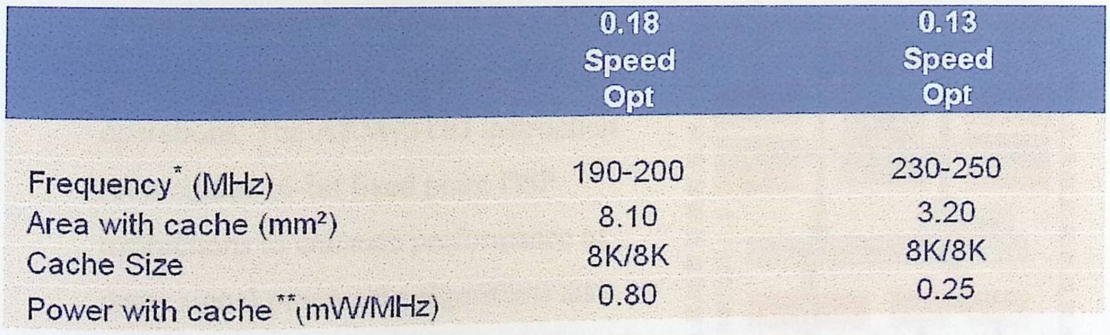
- Industry standard 32-bit AMBA bus interface
- 5-stage integer pipeline achieves 1.1 MIPS/MHz
- Up to 300 MIPS (Dhrystone 2.1) in a typical 0.13µm process
- ETM interface for real-time trace capability with ETM9
- Excellent debug support for SoC designers, including ETM interface
- 8-entry write buffer - avoids stalling the processor when writes to external memory are performed
- Portable to latest 0.18µm, 0.15µm, 0.13µm silicon processes.

Benefits:

- Runs all major OSs and existing middleware.
- Single development toolkit for reduced development costs and shorter development cycle time
- Multiple sourcing from industry-leading silicon vendors
- Upward migration path to Cortex family
- Excellent debug support for SoC designers

Instruction set can be extended by the use of coprocessors [9]

Performance Characteristics



	0.18 Speed Opt	0.13 Speed Opt
Frequency* (MHz)	190-200	230-250
Area with cache (mm²)	8.10	3.20
Cache Size	8K/8K	8K/8K
Power with cache **(mW/MHz)	0.80	0.25

Figure 2.9 performance characteristics

* Worst case conditions – 0.18µm process - 1.62V, 125C, slow silicon ; 0.13µm process - 1.08V, 125C, slow silicon

** Typical case conditions–0.18µm process–1.8V, 25C, typical silicon ; 0.13µm process - 1.2V, 25C, typical silicon

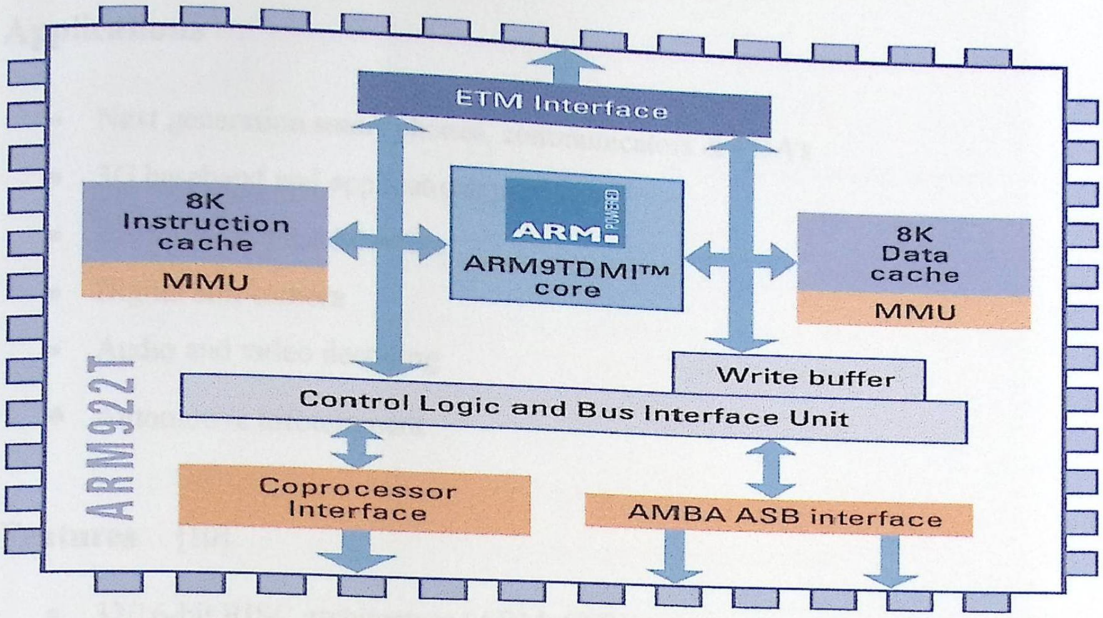


Figure 2.10 ARM9TDMI Core 2-ARM926EJ-S

2- ARM926EJ-S Jazelle-enhanced macrocell

- The ARM926EJ-STM fully synthesizable processor features a Jazelle technology enhanced 32-bit RISC CPU, flexible size instruction and data caches, tightly coupled memory (TCM) interfaces, memory management unit (MMU). It also provides separate instruction and data AMBA AHBTM interfaces particularly suitable for Multi-layer AHB based systems. The ARM926EJ-S processor implements the ARMv5TEJ instruction set and includes an enhanced 16 x 32-bit multiplier, capable of single cycle MAC operations. The ARMv5TEJ instruction set includes 16-bit fixed point DSP instructions to enhance performance of many signal processing algorithms and applications as well as supporting Thumb and Java by decode execution.

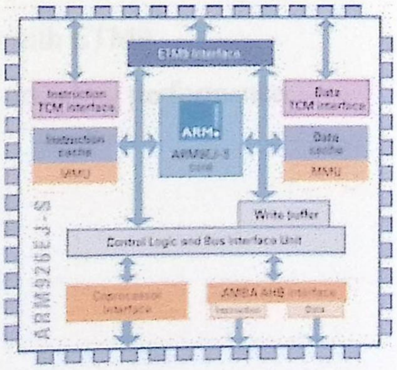


Figure 2.11 ARM9EJ-S Core

- A hardened implementation of the ARM926EJ is now available from the ARM Processor Foundry Program and the Design Start Program [10].

Applications

- Next generation smart phones, communicators & PDA's
- 3G baseband and applications processor
- Platform OS based devices
- Digital still camera
- Audio and video decoding
- Automotive infotainment

Features [10]

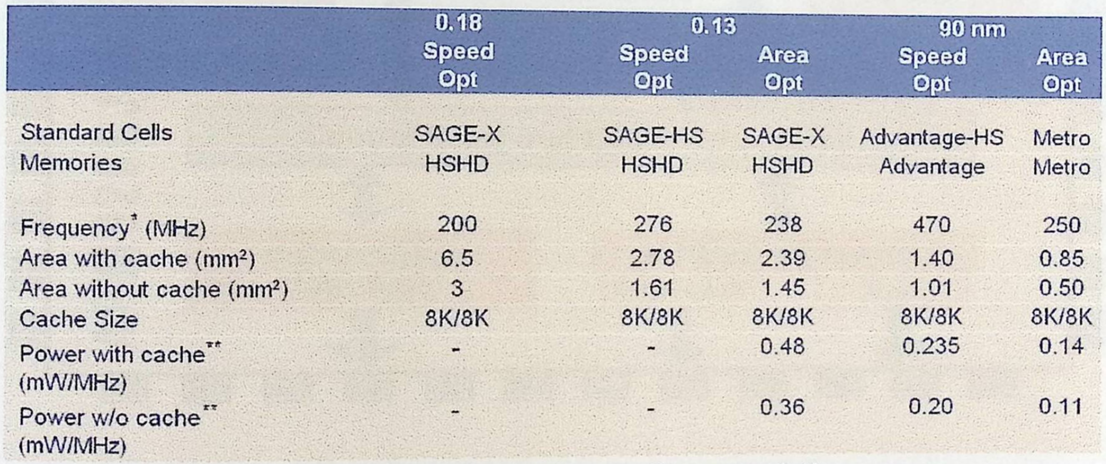
- 32/16-bit RISC architecture (ARMv5TEJ)
- 32-bit ARM instruction set for maximum performance and flexibility
- 16-bit Thumb instruction set for increased code density
- DSP instruction extensions and single cycle MAC
- ARM Jazelle technology
- MMU which supports operating systems including Symbian OS, Windows CE, Linux
- Flexible instruction and data cache sizes
- Instruction and data TCM interfaces with wait state support
- EmbeddedICE-RT logic for real-time debug
- Industry standard AMBA bus AHB interfaces
- ETM interface for Real-time trace capability with ETM9
- Optional MOVE Coprocessor delivers video encoding performance.

Benefits

- Runs all major OSs and existing middleware
- Single chip MCU, DSP and Java solution
- Support for leading Java run-times
- High-efficiency Java bytecode execution
- Ultra-low Java power consumption
- Java JIT compiler performance without the disadvantages
- Jazelle support code has no increase in VM size

- Simple single-processor software structure, no need for software partitioning across MCUs
- Single development toolkit for reduced development costs and shorter development cycle time
- Multiple sourcing from industry-leading silicon vendors
- Code-compatible upward migration path through to the latest Cortex family of processors
- Process portable synthesizable design
- Excellent debug support for SoC designers
- Instruction set can be extended by the use of coprocessors
- ARM-EDA Reference Methodology deliverables significantly reduce the time to generate a specific technology implementation of the core and to generate industry standard views and models [10].

Performance Characteristics



	0.18	0.13		90 nm	
	Speed Opt	Speed Opt	Area Opt	Speed Opt	Area Opt
Standard Cells	SAGE-X	SAGE-HS	SAGE-X	Advantage-HS	Metro
Memories	HSHD	HSHD	HSHD	Advantage	Metro
Frequency* (MHz)	200	276	238	470	250
Area with cache (mm²)	6.5	2.78	2.39	1.40	0.85
Area without cache (mm²)	3	1.61	1.45	1.01	0.50
Cache Size	8K/8K	8K/8K	8K/8K	8K/8K	8K/8K
Power with cache** (mW/MHz)	-	-	0.48	0.235	0.14
Power w/o cache** (mW/MHz)	-	-	0.36	0.20	0.11

Figure 2.12 Performance Characteristics

* Worst case conditions – 0.18µm process - 1.62V, 125C, slow silicon ; 0.13µm process - 1.08V, 125C, slow silicon ; 90nm process - 0.9V, 125C, slow silicon

** Typical case conditions– 0.18µm process–1.8V, 25C, typical silicon ; 0.13µm process - 1.2V, 25C, typical silicon ; 90nm process - 1V, 25C, typical silicon

Core area, frequency range and power consumption are dependent on process, libraries and optimizations. The numbers quoted above are in figure 2.12 illustrative of synthesized cores using general purpose TSMC process technologies and ARM Artisan standard cell libraries and RAMs.

The speed optimized implementations refer to the library choices and synthesis flow decisions and tradeoffs made in order to achieve the target frequency performance. The area optimized implementations refer to the library choices and synthesis flow decisions and tradeoffs made in order to achieve a target area density.

The area w/o cache numbers quoted exclude RAM area, but include all logic including memory management, cache control and debug. The area with cache numbers quoted

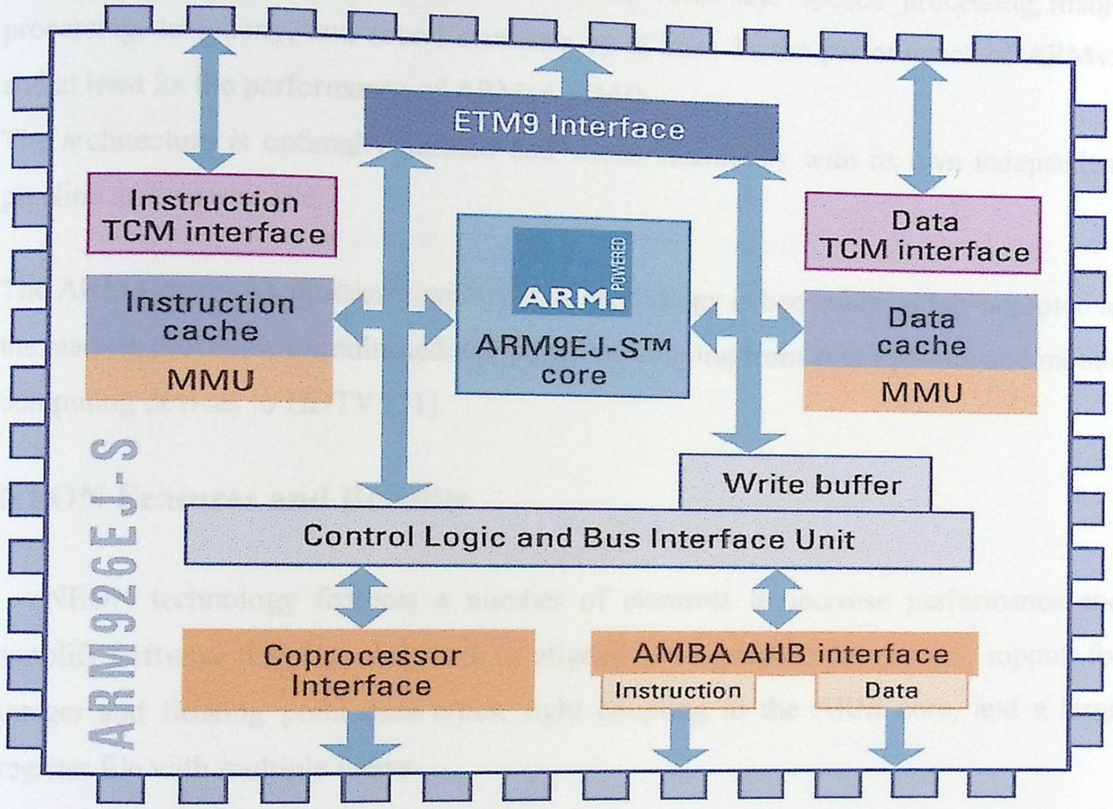


Figure 2.13 ARM9EJ-S Core

2.5 NEON Technology

ARM NEON technology is a 128 bit SIMD (Single Instruction, Multiple Data) architecture extension for the ARM CortexTM-A series processors, designed to provide flexible and powerful acceleration for intensive multimedia applications, thereby delivering a significantly enhanced user experience.

NEON technology accelerates multimedia and signal processing algorithms such as video encode/decode, 2D/3D graphics, audio, voice and speech processing, image processing, telephony, and sound synthesis by at least 3x the performance of ARMv5 and at least 2x the performance of ARMv6 SIMD

The architecture is optimally defined and works seamlessly with its own independent pipeline and register file.

The ARM Cortex-A8 processor with NEON technology is becoming widely accepted as the leading processor in multimedia applications ranging from smart phones and mobile computing devices to HDTV [11].

NEON Features and Benefits

NEON technology features a number of elements to increase performance and simplify software development, such as aligned and unaligned data access, support for integer and floating point data types, tight coupling to the ARM core, and a large register file with multiple views.

- Aligned and unaligned data access allows for efficient vectorization of SIMD operations.
- Support for both integer and floating point operations ensures adaptability to a broad range of applications, from compression decoding to 3D graphics.
- Tight coupling to the ARM core provides a single instruction stream and a unified view of memory, presenting a single development platform target with a simpler tool flow.

The large NEON register file with its multiple views enables efficient handling of data and minimizes access to memory, enhancing data throughput performance..

The technology provides system designers with a wide range of features and associated benefits to enable the development of compelling, feature-rich multimedia devices [12] .

ARM NEON technology is an architecture option with the ARMv7A architecture and is designed to address the demands of next generation high-performance, media intense, low power mobile handheld devices. NEON technology is a 64/128-bit hybrid SIMD architecture, developed by ARM to accelerate the performance of multimedia and signal processing applications including video encode/decode, 3D graphics, speech processing, compressed audio decoding, image processing, telephony and sound synthesis .

2.6 Summary

This chapter covered different topics that are related to mobile architecture, its basic component and their interaction and relation between each other.
Also we talked about NEON technology and its benefit for increase the performance.

CHAPTER THREE 3

Project Conceptual Design

3.1 Overview

This chapter provides a detailed description of the project objectives; various options for increasing the mobile performance, general description about what we going to do of the works.

3.2 Project Objectives

The main objective of this project is to get enough information about issues to be met to get the maximum performance in mobile when run applications, also gather information about problems facing user among using mobile device, and the available solutions to decrease these problems.

What we will do in this project is get more information and the ability to control the running tasks on the mobile phone. as well as displaying detailed information about tracking CPU load and free memory, so we will install a task manger program on Nokia n96 mobile device to measure these things, and know what processes that CPU working on and kill any un useful one, to make the CPU free and ready for any application that user go to start, and know what is the programs that running on the RAM and make it free and ready for any applications that the user want to run or use it.

Another objective in our project is to improve the display and speed of mobile when using the browser of mobile to get through to internet by enhancement of a web page as an example.

3.3 Performance Issues

Some of the main issues that must be met to achieve good performance are:

- Know what processes make the CPU busy, and what make it idle and check if these processes are important or not, and see if we kill these processes, this will not affect on mobile work or performance.

- Know what applications are running on the RAM and go to end it and see if we terminating these applications this will the RAM ready for any new applications, and in the same time not affect on the performance of the mobile.
- Improve and increase the effectiveness of the task manager, to ensure that it works in a real time, and take no large space of mobile RAM when doing its job.
- Select a proper resolution which enables us to improve the display when run an application.
- In web browsing we make the web page a user-friendly page as much we can, and improve speed, display and performance of this page.

3.4 Problems Facing Users

When users run an application on mobile he may face many problems such as:

- The low speed of the application when running it.
- There is no enough space memory on the RAM for the application need to be run.
- The mobile may not have the program that helps to start the application.
- The resolution for the display is not good for the user application.
- The battery for the mobile have no enough charge which cause the mobile turn off.
- Facing difficulties when using the button of the mobile during the running of an application.
- The designers of websites doesn't consider how this sites will appear and work on mobiles, which make browsing more difficult.
- A problem appears when using the Internet on mobiles is that most mobiles just come with a standard keypad and a couple of hot keys. There's no mouse and no keyboard, so scrolling around web pages and selecting an area to click on can be a hassle.

3.5 Available Solutions

In our project we will find solutions for these problems such as:

- Killing any un-useful processes make the CPU busy or interrupted.
- Terminate any unusable application that loaded on the RAM to make it free and ready to load the new application or program that user want ,the main steps are :
    1- Check what processes are running now.
    2- If the RAM is free then give the ability to the user to run his program.
    3- If the RAM is busy then task manager must check the running application, if it is an important application don't terminate it and go back to the task manager waiting when this application end , else task manager will terminate this application and give the chance to run user application.
- Decrease the power dissipation of the mobile as much we can when there is no applications or programs running on the mobile
- One of the solutions related to internet browsing using keypad on mobile is touch screen handsets flooding the market. Flicking around a web page with your finger and tapping to select icons this solution is available on most touch screen mobile, and some even come with a full QWERTY keyboard function when you're typing text
- Windowing is a good solution for those problems facing user when he browse internet, its main idea is to divide the loaded page into parts.
- Neon technology which accelerates multimedia and signal processing algorithms such as video encode/decode, 2D/3D graphics, audio, voice and speech processing, image processing, telephony, and sound synthesis.
- The combination of Dolby Mobile and NEON technologies can efficiently maximizing battery life.

3.6 Task manager

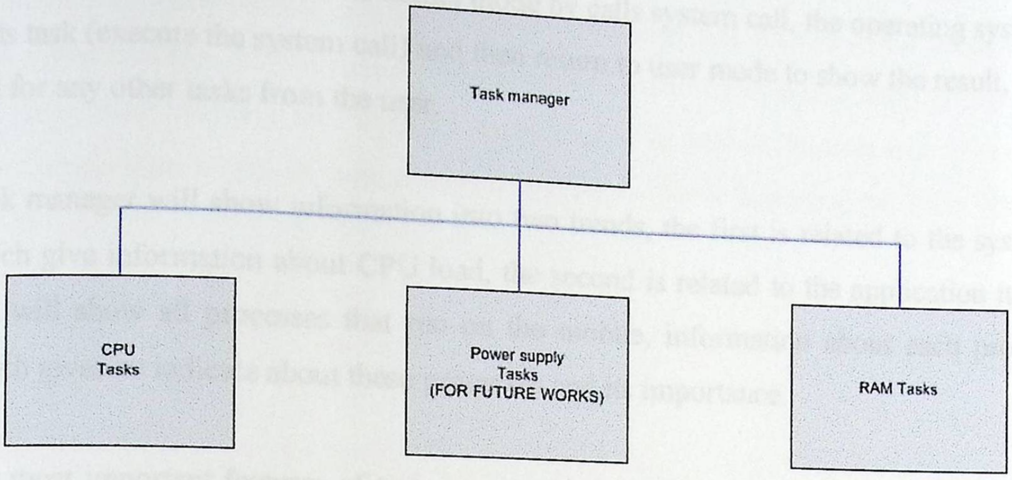


Figure 3.1 Task manager

Task Manager is a program that provides information about programs and processes running on your mobile. It also displays the most commonly used performance measures for processes; we can use Task Manager to monitor key indicators of mobile's performance. You can see the status of the programs that are running; we can also assess the activity of running processes, and data on CPU and memory usage.

In our project we will install this program on a Nokia N96 device which enable us to see the state of CPU and checks what processes make it busy and study if these processes are important or not, giving the user an option to kill them if they are not important, this will increase the performance of the mobile.

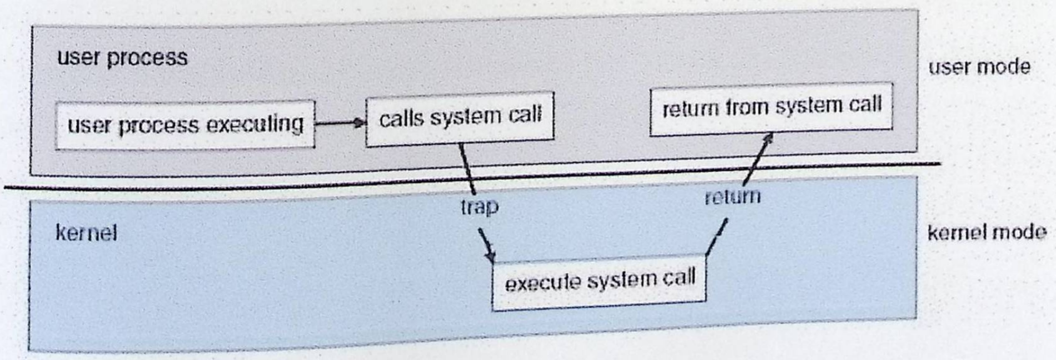


Figure 3.2 Task Manager in user and kernel modes

As shown in the figure 3.2 Task manager do its work in both kernel and user mode, user can control task manager, and ask it to do some tasks (as terminating a process), then task manager change its mode to kernel mode by calls system call, the operating system do its task (execute the system call) and then return to user mode to show the result, and wait for any other tasks from the user.

Task manager will show information into two trends, the first is related to the system, which give information about CPU load, the second is related to the application itself, this will show all processes that run on the mobile, information about each process which gives an indicate about these processes and its importance.

The most important features of task manager that it is allows you to get more control and information over running tasks on your mobile phone. You can quickly switch tasks, kill processes and threads to free some memory space, as well as display information about system resources.

3.7 Web browsing

More and more mobile phones users are browsing and searching the Internet on their mobile device , If you design websites for PC viewing then you need to consider how your sites will look and work on mobiles. As the mobile Internet has developed savvy users have come to expect higher standards when browsing on their mobile device.

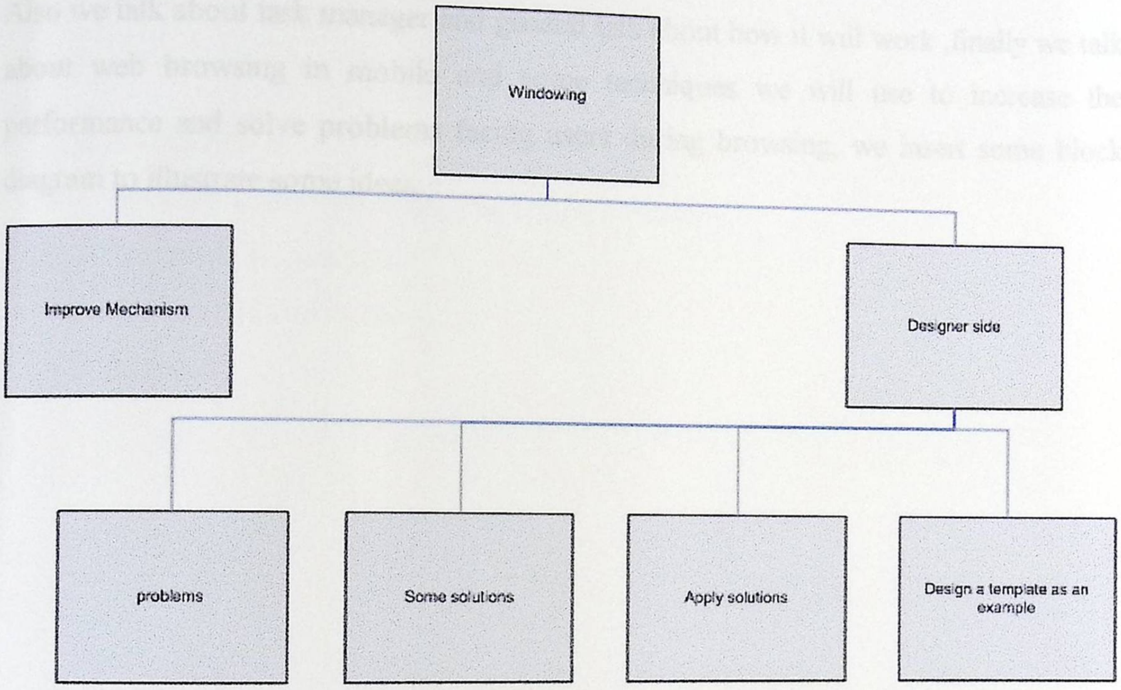


Figure 3.3 Windowing

N96 as other mobile devices use web browsers as an application , which able the users to do their important tasks without need for personal computer or if it doesn't available.

Figure 3.3 illustrate that our work in windowing part will be into two directions, first we will improve windowing mechanism to achieve our project objectives, and then we will steer to design direction, determine problems facing users in browsing, solve it, and design a template to show results.

3.8 Summary

In this chapter we discuss the major problems that face users during run of a mobile application or program.

We list some available solutions for these problems that help to increase mobile performance.

Also we talk about task manager and general talk about how it will work ,finally we talk about web browsing in mobile and some techniques we will use to increase the performance and solve problems facing users during browsing, we insert some block diagram to illustrate some ideas.

CHAPTER FOUR 4

Detailed Technical Project Design

4. 1 Overview

After explaining the theoretical background, the general block diagram of the system, and how the system works, there is a need to describe the system in greater detail. In this chapter, we will describe the specific system design with all its features that enables the system to work so well.

Here, there is no hardware needed to be build from the original device. Instead, we will use the mobile phone itself as hardware for this project. To facilitate this, we will describe these components in detail, and how they will be used.

4. 2 Detailed Description Of The Project Phases

- Design Task manger and then we install the (sis) file to the N96 Nokia mobile using Nokia PC Suite program or using symbian sis program to run the (exe) file that out from the debug of the code.

- When we start the task manger ,The program will show what process and applications are run on mobile, also it will show the threads count and the process ID.

- The task manger program will allow us to terminate any not useful program and application from the mobile to make the CPU ready to any new application.

- Improve windowing technique to be suitable to N96 mobile device and apply it on a web page loaded on mobile web browser.

- Design a template for a web page using Dreamweaver ,this template will used to inform web designer about the best size for their web pages to be suitable with windowing technique.

- The template will help designer when they design their pages, to make each part of this page gathering information in a dynamically way that make browsing more comfortable for users.
- What we are intend by dynamically is that each part of the web page must contains complete information.

4. 3 Project Components

4.3.1 Task Manger Program:

It is a program build in C# programming language ,the compilation of the code will create an exe file which is not compatible with symbian OS , and to solve this problem we use symbian program to run that file , or we can use another way which is a license for visual studio program that convert exe file to sis file that will be installed to the N96 Nokia mobile using Nokia PC Suite program.

4.3.1 .Net Compact Framework

The .NET Compact Framework provides managed interfaces to a substantial set of the Windows CE APIs, but there are some sections that have not been covered. This is where Platform Invoke (P/Invoke) services come to our rescue. P/Invoke is a service that enables managed code to call unmanaged functions such as those in the Windows CE API.

P/Invoke locates and invokes an exported function and marshals its arguments (integers, strings, arrays, structures, and so on) across the process boundaries as needed. The marshalling support in the .NET Compact Framework is a subset of that available on the full .NET Framework. For example, the .NET Compact Framework common language runtime cannot marshal objects within structures or reference types. This is called deep marshalling. However, if a structure contains simple types, they can be marshaled if the unmanaged code is able to conform to the structure. Therefore, in the cases when a native API function expects a complex structure that may include nested structures or pointers to other the structures, strings or some other not-bitable types, it is possible to provide conversion of the structures to the byte arrays and pass them as an arguments to the native functions. It is a little bit more work than just simply converting the structure declarations from C# header files, but it is worthwhile in the end, especially if the required native function call is the only way to achieve the required functionality. [17]

4.3.3 C# Programming Language :

C# (pronounced "see sharp") is a multi-paradigm programming language encompassing imperative, functional, generic, object-oriented (class-based), and component-oriented programming disciplines. It was developed by Microsoft within the .NET initiative and later approved as a standard by Ecma (ECMA-334) and ISO (ISO/IEC 23270). C# is one of the programming languages designed for the Common Language Infrastructure.[18]

The ECMA standard lists these design goals for C#: [18]

□ C# language is intended to be a simple, modern, general-purpose, object-oriented programming language.

□ The language, and implementations thereof, should provide support for software engineering principles such as strong type checking, array bounds checking, detection of attempts to use uninitialized variables, and automatic garbage collection. Software robustness, durability, and programmer productivity are important.

□ The language is intended for use in developing software components suitable for deployment in distributed environments.

□ Source code portability is very important, as is programmer portability, especially for those programmers already familiar with C and C++.

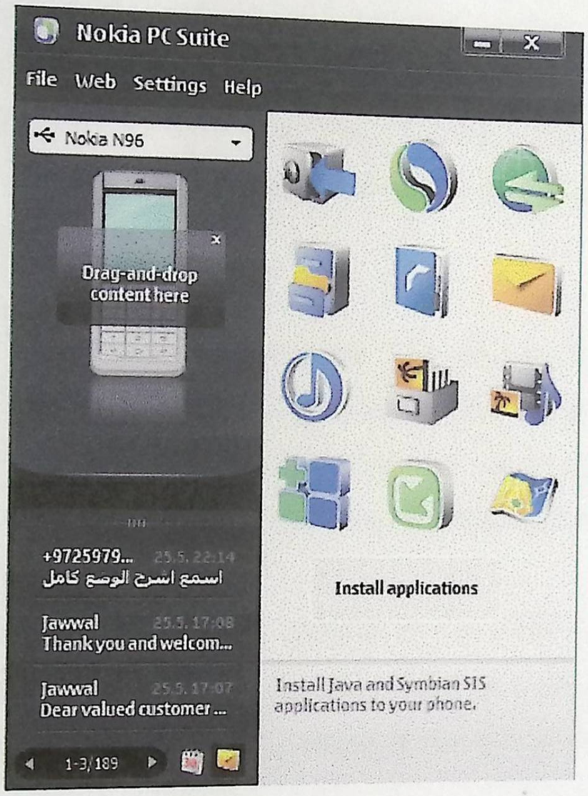
□ Support for internationalization is very important.

□ C# is intended to be suitable for writing applications for both hosted and embedded systems, ranging from the very large that use sophisticated operating systems, down to the very small having dedicated functions.

□ Although C# applications are intended to be economical with regard to memory and processing power requirements, the language was not intended to compete directly on performance and size with C or assembly language.

4.3.4 PC Suite :

Nokia PC Suite is a software package used to establish an interface between Nokia mobile devices and computers that run Microsoft Windows operating system. It can be used to transfer music, photos and applications. It can also be used to send Short Message Service (SMS) messages or act as a modem to connect the computer to the Internet. A mobile phone can be connected by USB, Bluetooth, or infrared. Nokia PC Suite is closed-source software and is required to access certain aspects of Nokia handsets.[20]



+9725979... 25.5. 22:14
اسمع اشرح الوضع كامل

Jawwal 25.5. 17:08
Thank you and welcom...

Jawwal 25.5. 17:07
Dear valued customer ...

Install Java and Symbian SIS applications to your phone.

Figure: 4.1 Nokia PC Suite

4.3.5 Adobe Dreamweaver software:

Is a web development application originally created by Macromedia, and is now developed by Adobe Systems, which acquired Macromedia in 2005.

Dreamweaver is available for both Mac and Windows operating systems. Recent versions have incorporated support for web technologies such as CSS, JavaScript, and various server-side scripting languages and frameworks including ASP, ColdFusion, and PHP.

5 User System Interface

4.4. 1 Hardware User Interface:

The hardware user interface is the smart phone that will be used in coordination with the software interface. All Nokia S60 series mobile phone share the same keys, these keys can be divided into subsections a follow: first the keypad (0 – 9) keys, (*) key, and (#) key, the second is the soft keys, the third is the navigation key , and the fourth part is the media keys.

The keypad is used to for numeric and text input. The soft keys are used for opening menus, selecting menu options, or canceling applications. The navigation key allows the cursor to be moved up, down, right, left, and pressing on it acts as selection or OK press ,and the media key is 4 keys used to play/pause ,stop ,forward and backward.

The user will use the keypad to enter the number of the mobile phone of the other person, the soft key will be used to select the option that we want, and the navigation key for selection ,and the media keys used to control media files as music and video .

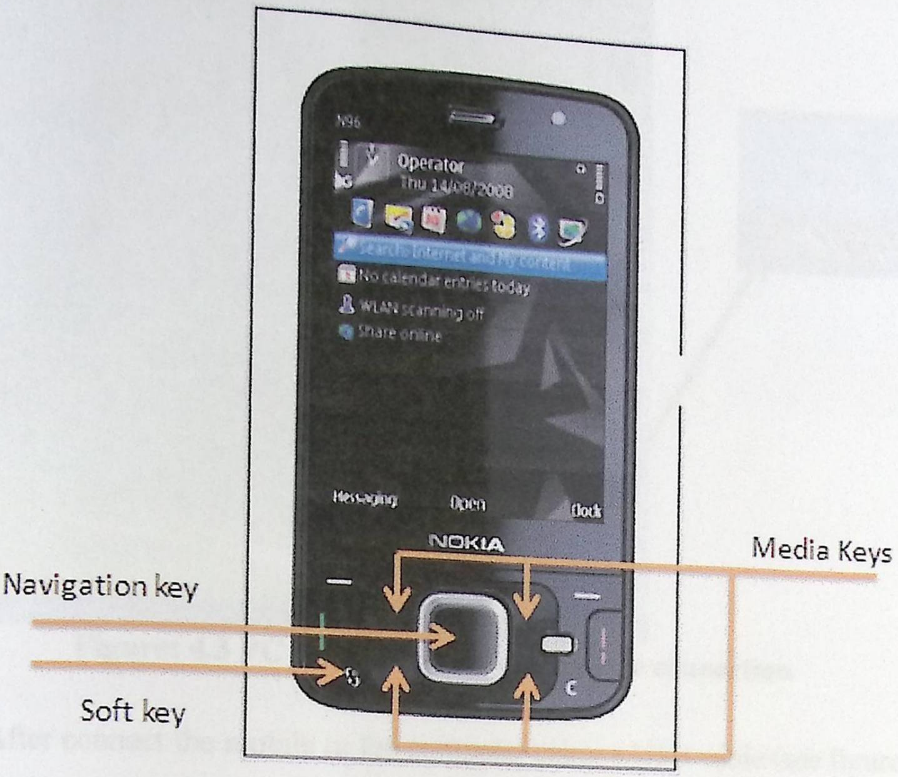


Figure: 4.2 N96 Phone Interface

4.4.2 Software User Interface:

4.4.2.1 Install An Application On Mobile:

The following step show how to install the sis file on the mobile device using PC Suite .

1-The icon of the PC suite show that there is no connection to any mobile device as shown below in figure 4.3

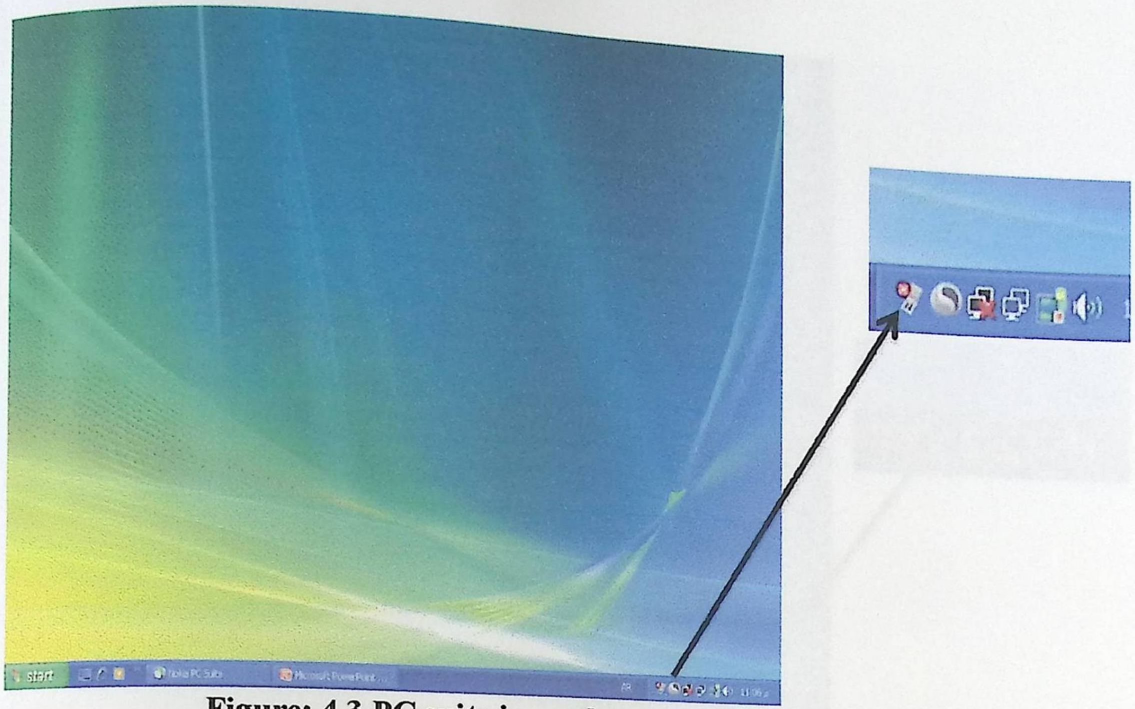


Figure: 4.3 PC suite icon when no mobile connection

2-After connect the mobile to the computer using a USB cable (see figure 4.4) , PC Suite will install the mobile device software and then the icon of the PC suite become lights and show that there is a mobile device that connect to the computer, and that can be seen in figure 4.5

Figure: 4.4 USB Cable

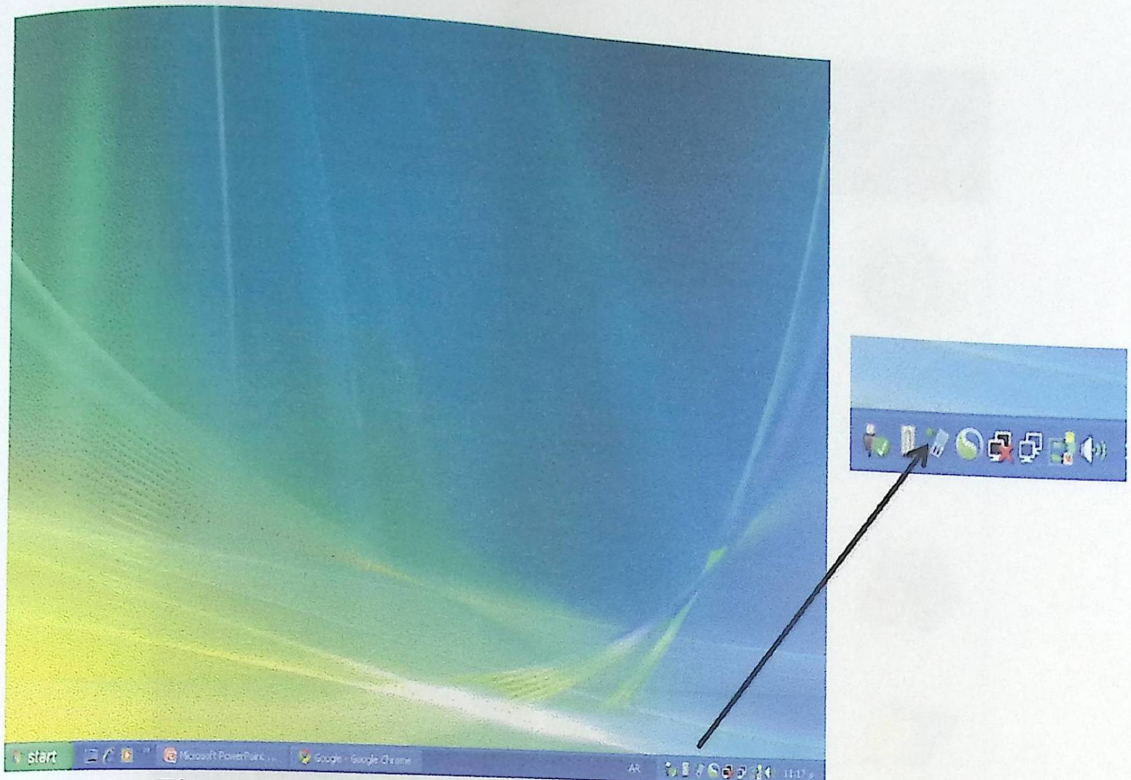
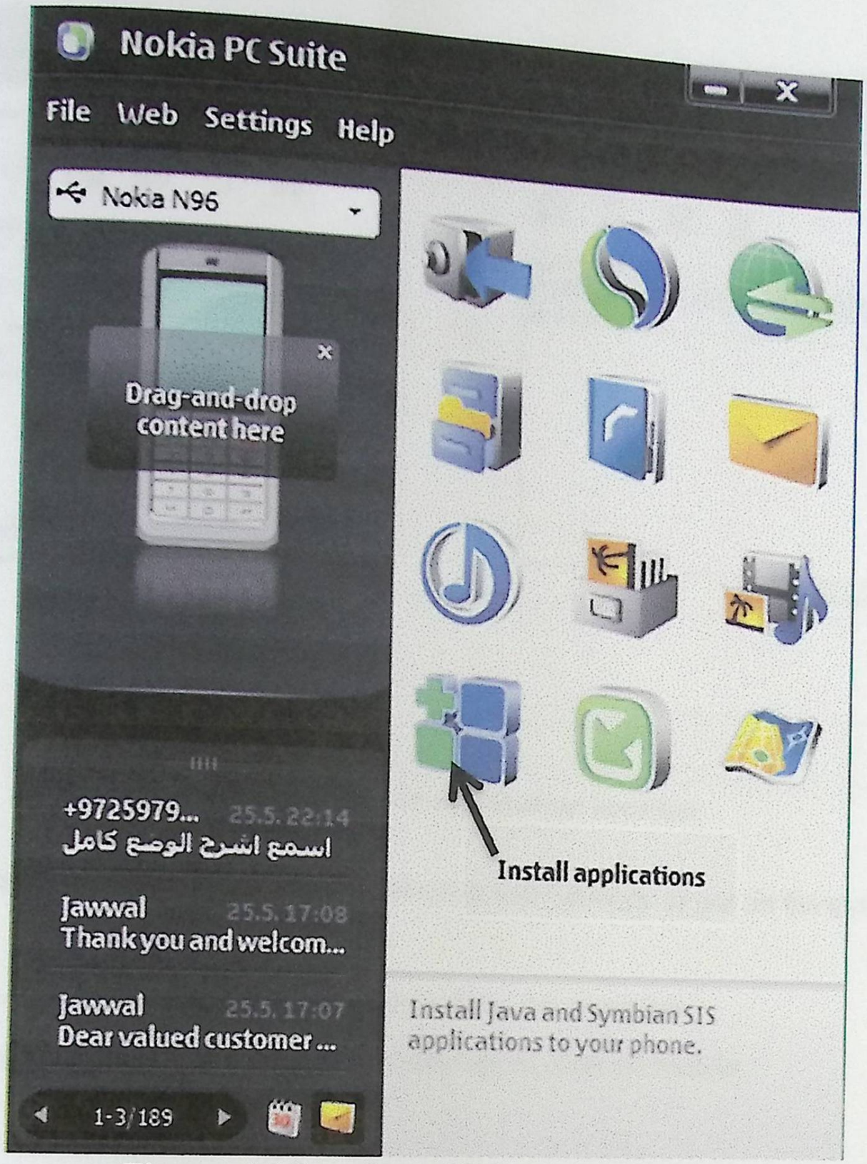


Figure: 4.5 PC suite icon when there is a mobile connection

3-Double click on the lighted icon will start Nokia PC Suite that shown in figure 4.6 which we used to install the .SIS file to the mobile.

4-click on the “Install applications ” icon to start the installation on the mobile device



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Jawwal 25.5. 17:08
Thank you and welcom...

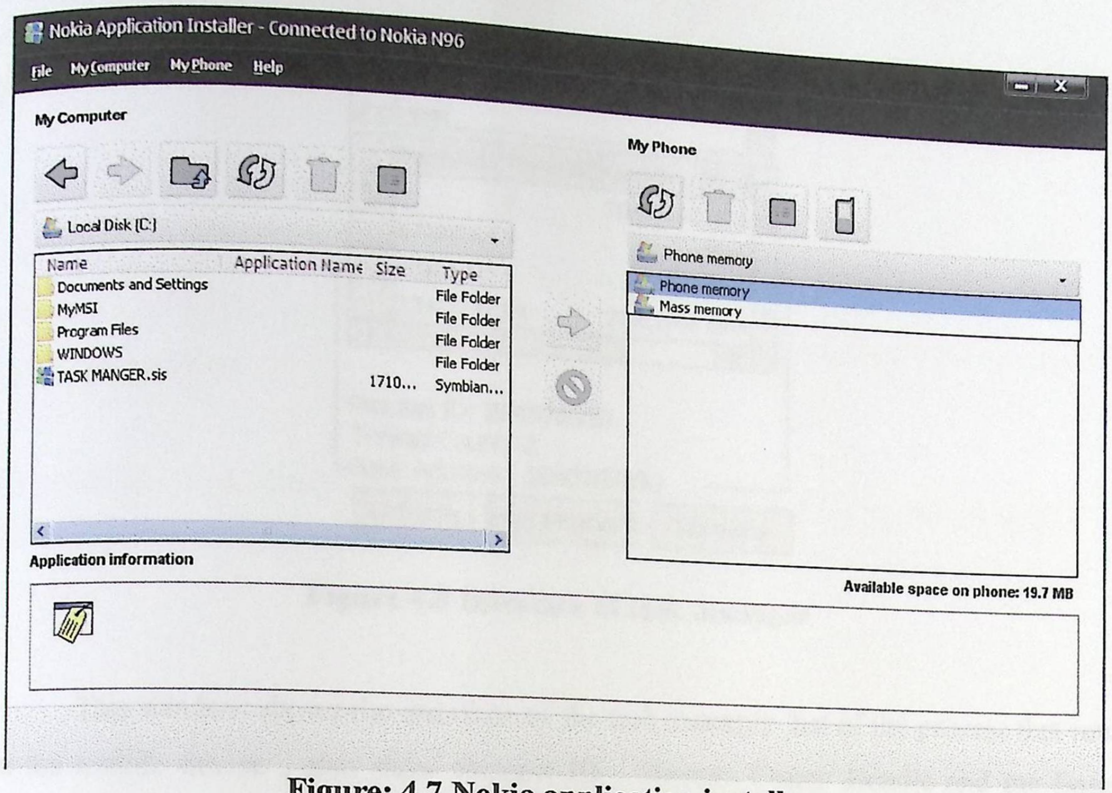
Jawwal 25.5. 17:07
Dear valued customer ...

Install Java and Symbian SIS applications to your phone.

Figure: 4.6 Interface of PC suite application

5-The PC Suite program will show a window in figure 4.7 which request to select the .SIS file to install it on the mobile device .

6-The program give the choice to select the target memory to install the application on as shown in figure 4.7 .



Name	Application Name	Size	Type
Documents and Settings			File Folder
MyMSI			File Folder
Program Files			File Folder
WINDOWS			File Folder
TASK MANGER.sis		1710...	Symbian...

Figure: 4.7 Nokia application installer

7-After done from install , the application will be ready to use on the mobile device.

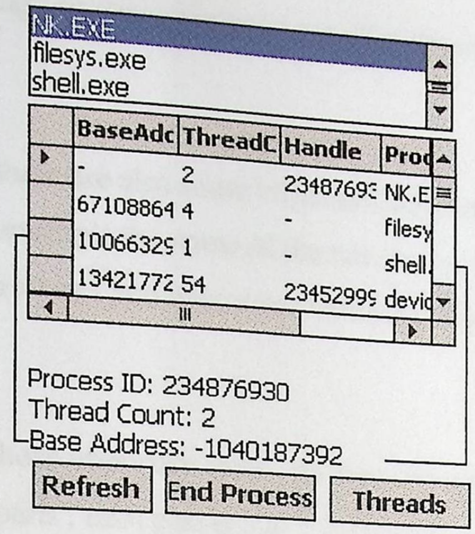
8- Now you can disconnect the mobile from the computer.

9-the application can be located in menu/application on mobile

4.4.2.2 How Task Manager Works:

In this section we will describe how to run the task manger application and how to use it.

First the application can reached by click on the menu key, then select the application which contain an icon for the task manger application , when we run the application the following window is appear



NK.EXE
filesys.exe
shell.exe

	BaseAdc	ThreadC	Handle	Proc
▶	-	2	23487693	NK.E
	67108864	4	-	filesy
	10066329	1	-	shell.
	13421772	54	23452999	devic

Process ID: 234876930
Thread Count: 2
Base Address: -1040187392

Figure 4.8 Interface of task manager

This window shows the interface of the task manager ,list of the process that run on the mobile device , also show Process ID , Threads Count ,Handle and the Base Address of the selected process ,the End Process button is used to end or terminate the selected process, the list of the process can be refreshed using the Refresh button after end any process ,thread button will show the total number of threads of all processes.

4.4.2.3 How Windowing Works

Guidelines For Web Pages

Here we mention some usability guidelines for web designers to help them on converting a PC web page to mobile web page and at the same time to make their pages good enough and compatible with windowing technique in the dynamic mode :

First , designers must find out the important sides from mobile user point of view , since mobile users who access internet pages want to see some sides that help them in finishing their jobs , and there are some other sides not important for them while they use mobile on browsing .

For example , consider that you are as student ,want to access PPU web page on mobile , the most important sides you want to see is for example your marks , university news , announcements , E-learning , so designers must consider those thing on designing process.

For the university itself , there are also some important sides they want to be considers in designing process , for example the name of the university, its banner , some information about the university , and may some information about Hebron city where the university locate.

When designer finds out those important sides , he then can start designing process considering that he has 9 parts , each part is 320 * 240 pixels and he must put the collected information on those parts in a logic way .

In designing process there are some additional guidelines help designers to make web pages compatible with mobile browsing and make their pages friendly to users below some of them :

- Sub-domains instead of (.mobi) or separate domains: when the .mobi top-level domain (TLD) first became available, a lot of buzz surrounded the news. While some websites use .mobi for mobile versions of their websites, it is currently more common to see using of sub-domain or a separate folder on the primary domain. One of the major benefits of using a sub-domain is that it keeps everything on one domain, rather than spreading things out and potentially confusing visitors, which make it faster and effective. You'll commonly see mobile versions of websites at such addresses as (mobile.example.com), (m.example.com), (example.com/mobile), (example.com/m).

- Simple options: One of the most intriguing things about mobile websites is the scaled-down options that are available to visitors.

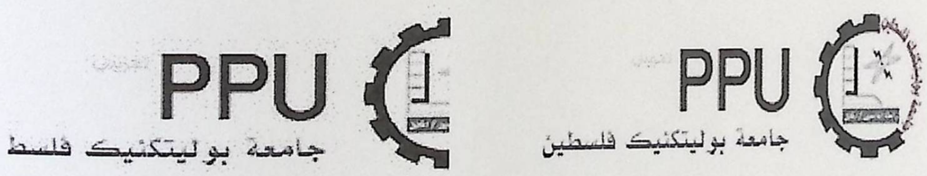
- White space : is an important part of any design, and it's something that's usually a challenge in Web design because there is a desire to get as much as possible in front of the visitor. White space becomes even more of a necessity in mobile design because the typical screen size is so much smaller. A jumbled website would be very user-unfriendly and very difficult to pull off in the mobile environment

- Lack of images: high-speed Internet connections have become more common in recent years. The average visitor on a desktop or laptop wants to see a visually engaging website, and, as a result, images are heavily used. However, when it comes to mobile design, excessive use of images often does more harm than good.

Main Idea For Windowing Technique

The main idea of windowing as a technique is to divide web pages into 9 equal parts, when applying in N96 mobile devices, but there are still problems on it, one of them is that programmers can't use numbers keypad to program it to some user functions since it used from web browsers to default functions as writing on text field and other different tasks.

Another problem in windowing technique is applying it on dynamically mode, what we mean by dynamic mode is illustrate on the following figure, part (a) show a part of a non-dynamic web page, part (b) show the same part but in dynamic mode.



a b

Figure 4.9 (a) non-dynamic part,(b) dynamic part

Again dynamic mode allow users to see full information on the web page or part of it, as we see in the previous figure if this part contain an image, this image must completely appear on this part, or if the part contain a text, this text must appear as a unit.

This will be benefit for both users and web browsers, for users dynamic windowing make browsing process more comfortable and easy, and if we consider that fast browsing is a goal for mobile browsing, then this technique is a good one to achieve this goal, other benefit for web browsers is decrease tasks performed by it, when whole information (text or images) appear as a unit on the same part this mean no need to download another part to see the complement of this image or text.

Since N96 mobile screen size is 240*320 pixel, this property must be considered by web browsers and web pages designers on design process, so each part must be the same size as N96 screen size, for example if part1 contain an image, this image must be 240*320 pixel or less, the same thing is applied on text, video, flash, and other information that may be on the page.

The following image show a web page consist of nine parts each of them is 240*320 pixel, mobile web page designer can put all needed information on this page, putting on each part the appropriate information, and in the same time these information must be full information.

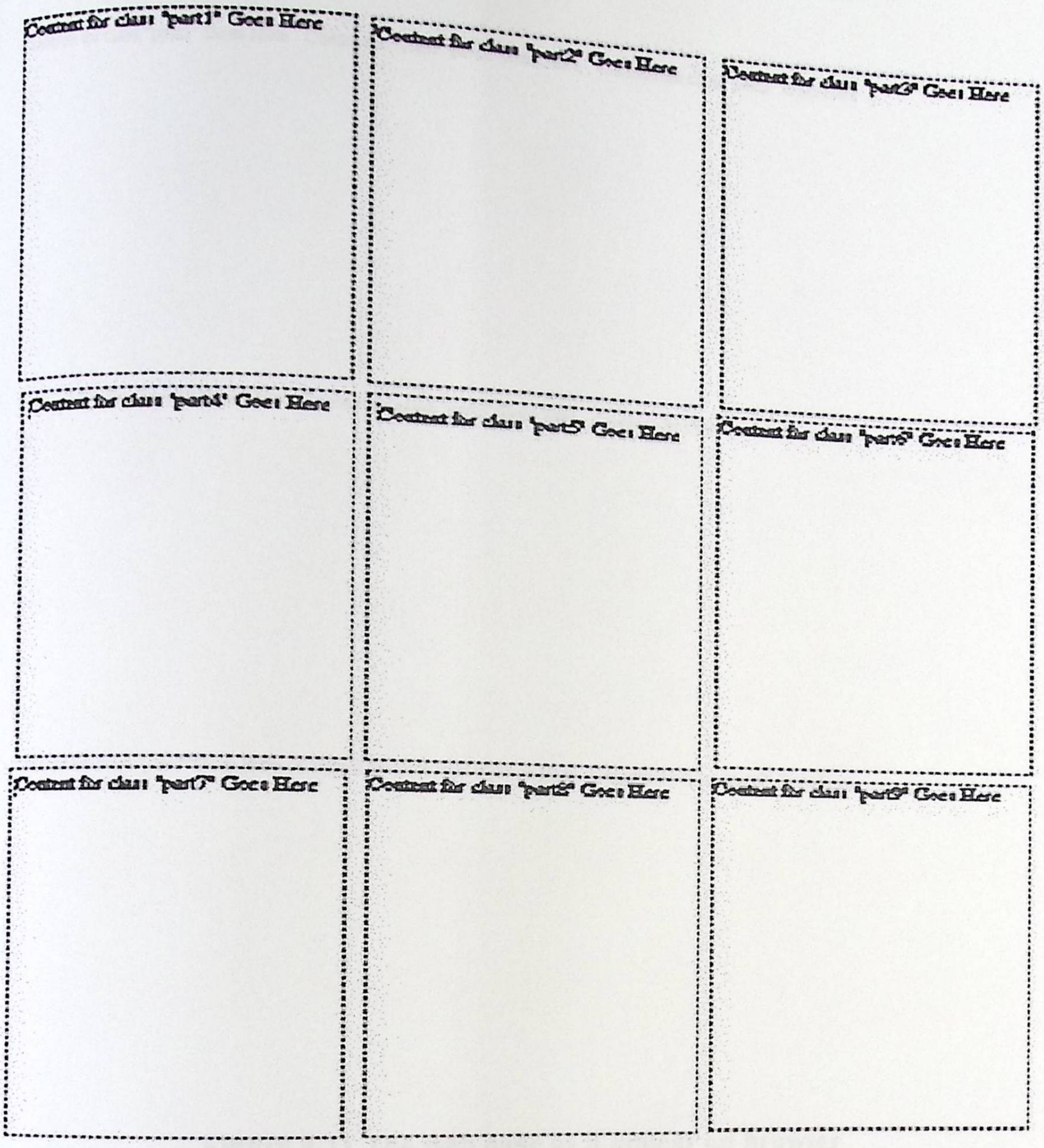

Content for class "part1" Goes Here
Content for class "part2" Goes Here
Content for class "part3" Goes Here
Content for class "part4" Goes Here
Content for class "part5" Goes Here
Content for class "part6" Goes Here
Content for class "part7" Goes Here
Content for class "part8" Goes Here
Content for class "part9" Goes Here

Figure 4.10 The web page as a template on Dreamweaver

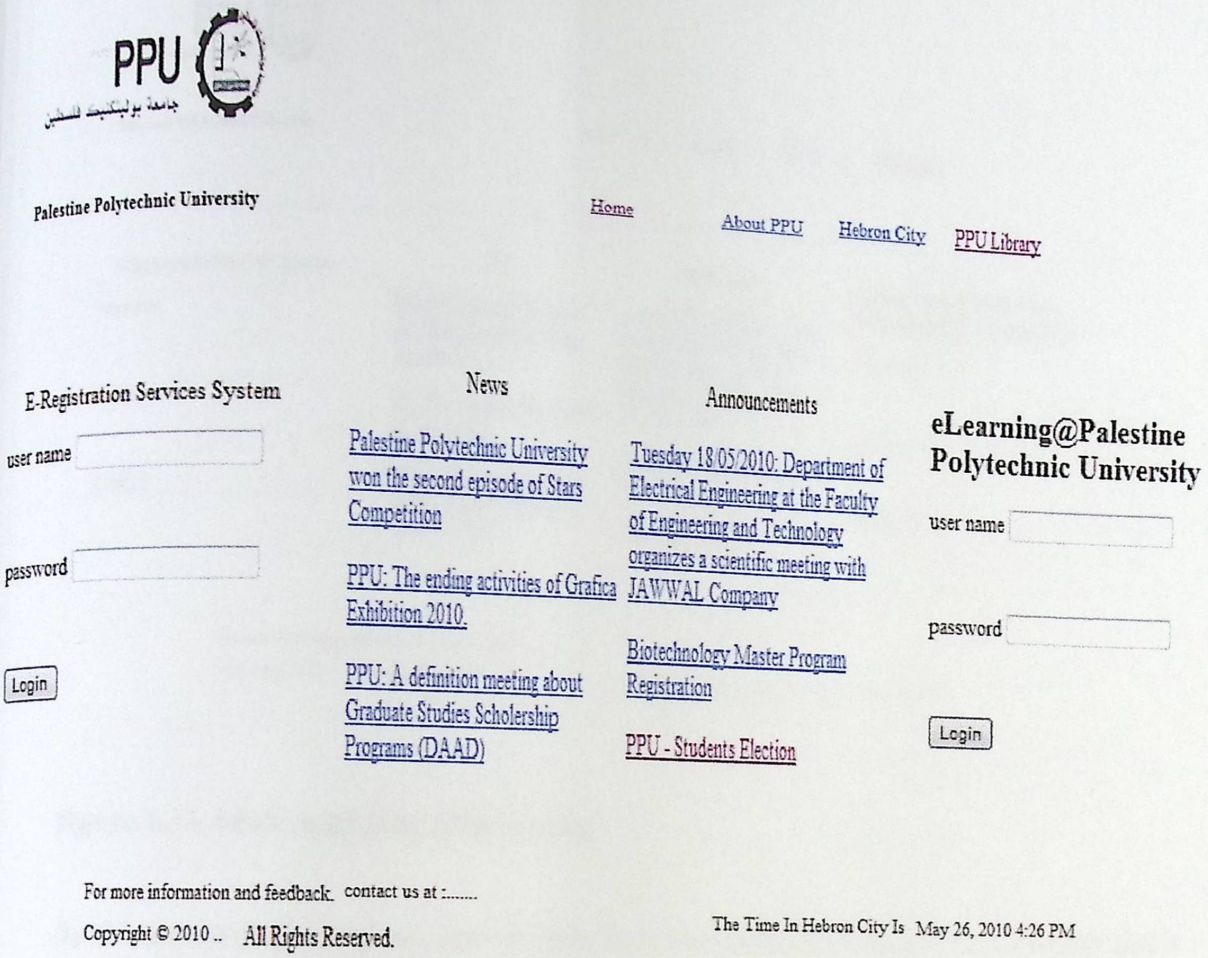


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Figure 4.12 Web page on PC browser.

If we request this page for mobile and apply windowing it will look like the following figure :

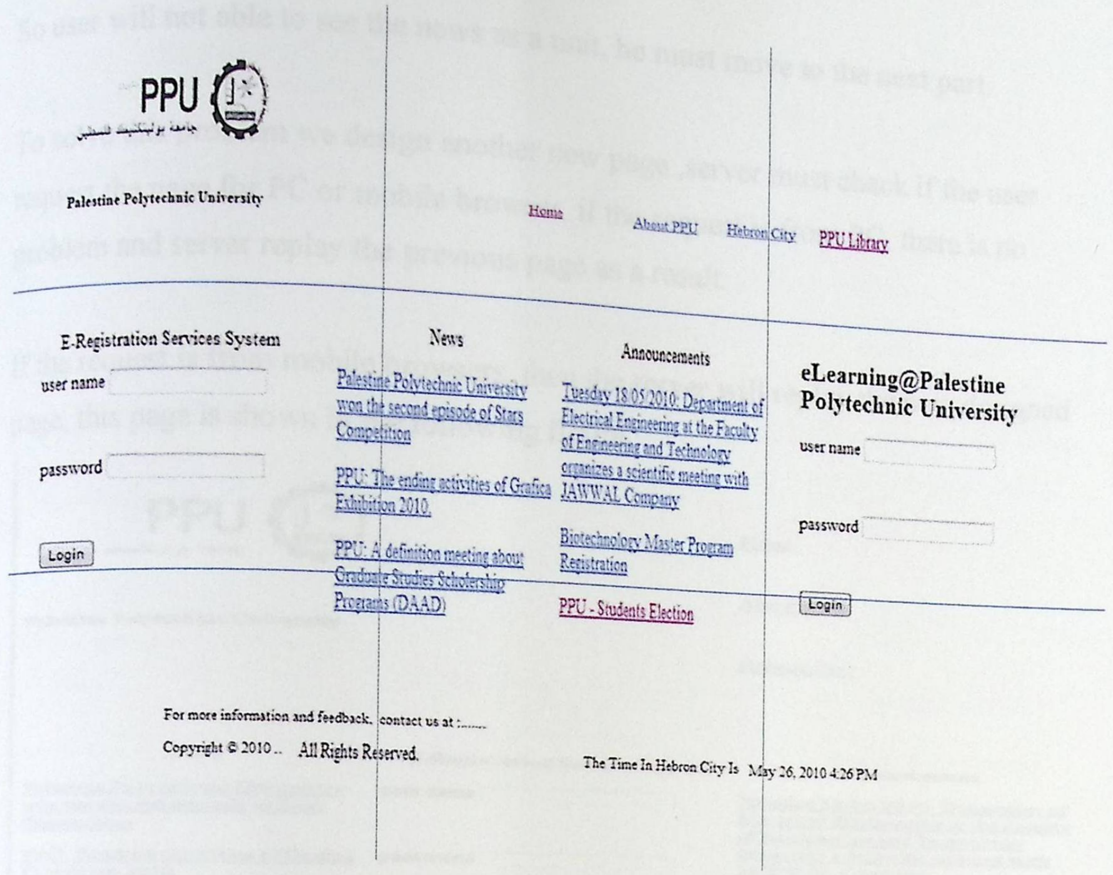

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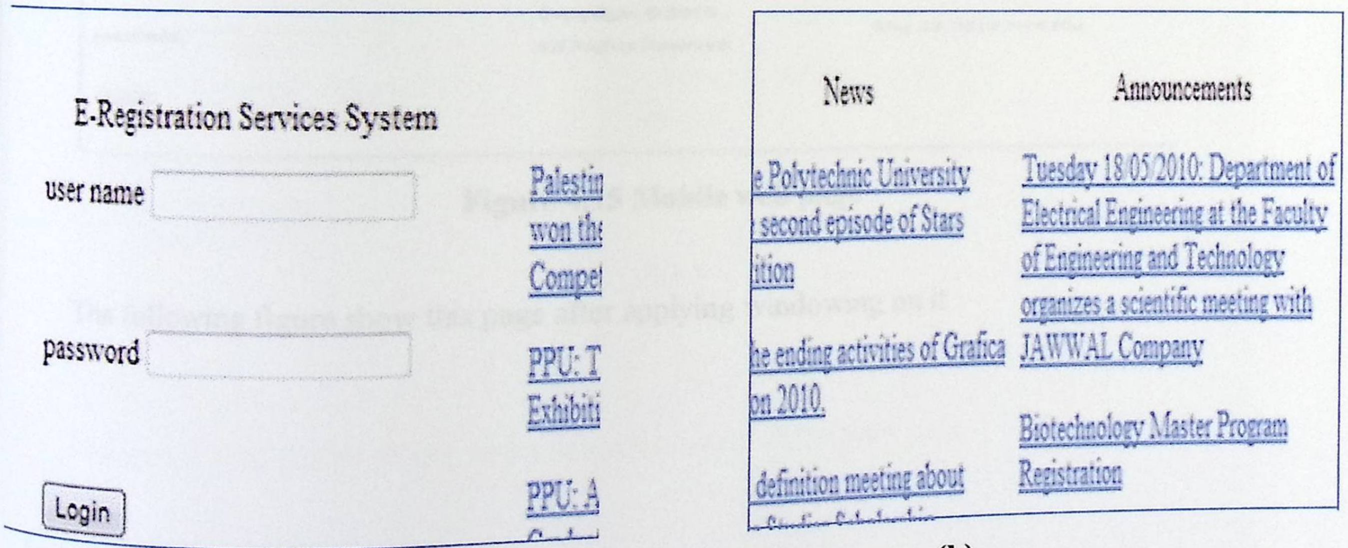
Figure 4.13 After applying Windowing

As we can see on this figure, not all parts have complete information, for example part 4 and 5 divide the news field as follow :



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(a)

(b)

Figure 4.14 (a) part4 of the page ,(b) part 5 of the page

So user will not able to see the news as a unit, he must move to the next part.

To solve this problem we design another new page ,server must check if the user request the page for PC or mobile browser, if the request is from PC, there is no problem and server replay the previous page as a result.

If the request is from mobile browsers, then the server will replay the new designed page, this page is shown in the following figure :

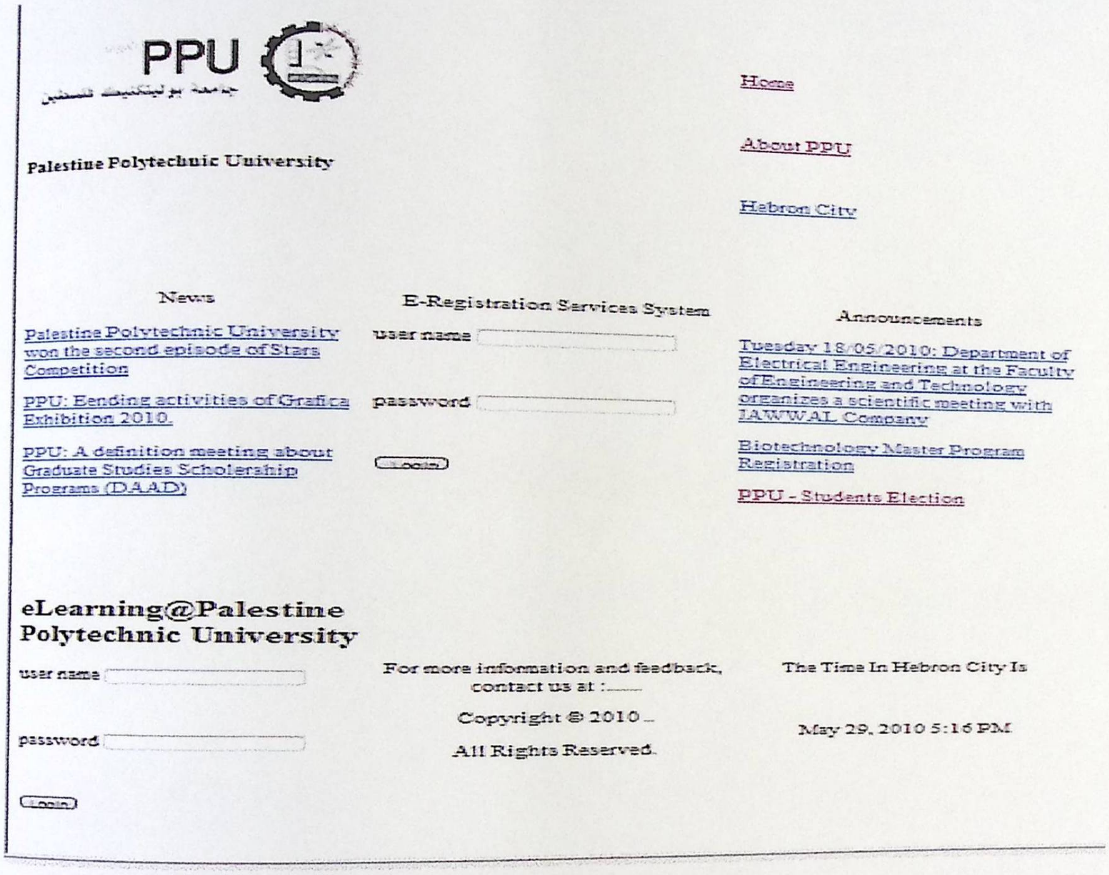

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Figure 4.15 Mobile web page

The following figure show this page after applying windowing on it

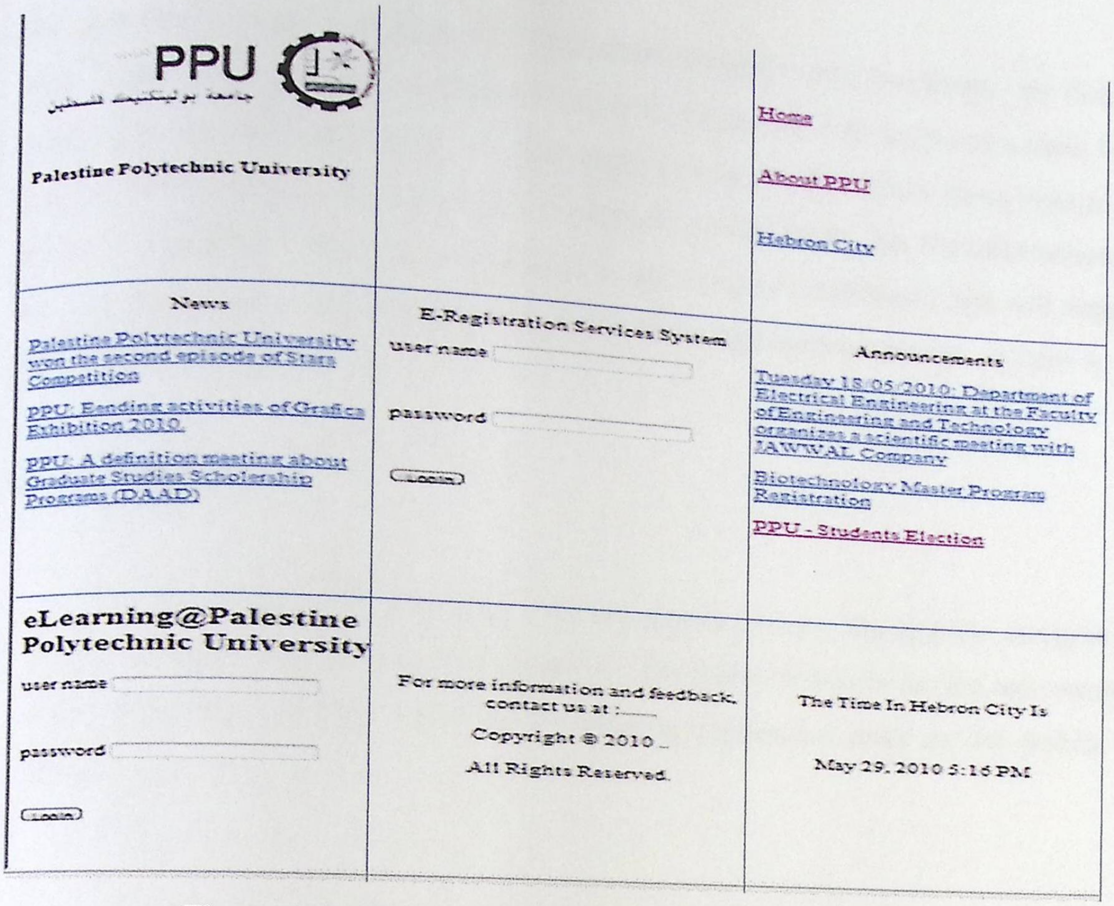

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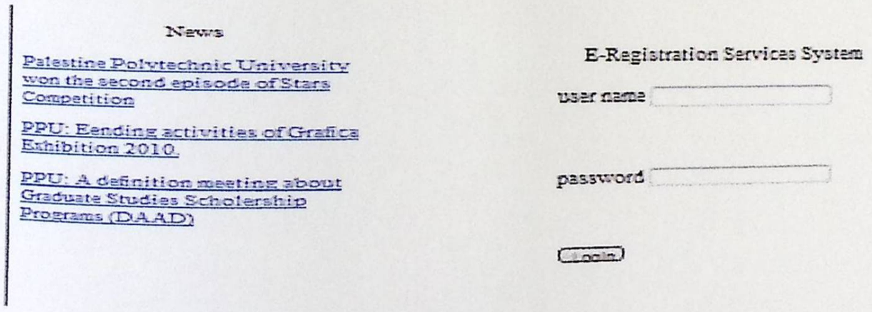
Figure 4.16 Mobile web page after applying windowing

As we can see, the problem is now removed, news now appear to the user as a unit, this is illustrated on the following figure



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(a) **(b)**

Figure 4.17 (a) part 4 of the web page , (b) part 5 of the web page

The information in the two pages (PC and Mobile pages) is into two forms , the first is static ,which mean that this information can't be change ,so if an access of a static link in the pages this will move us to another page have these information, news links is an example for this form, the other form is dynamic ,which mean that the information is stored in a database , and can be changed, so any access to a dynamic link will import the information from the database, marks on the E_registration services system is an example of this form .

6 Summary

In this chapter the description of the project phases, the specific component needed for build the code and install the (sis) file to the mobile to run the task manger application, also we show how the windowing application work on the mobile in details.

CHAPTER FIVE

5

Software System Design

5. 1 Overview

This chapter gives a description of the implementing system from the programming point of view. This will include the classes, functions and methods that are used in the program and their tasks, also we will show windowing technique is work on the mobile when get access the internet and the flow chart that explain the sequence of the project.

5. 2 Mobile Task Manger

5.2.1 Software Needed for the Project

5.2.1.1 Mobile Phone Software Requirements:

The mobile phone is programmed in Carbid C++ programming language, and the complier and all the needed tools are developed for MS Window XP operating system. Installing the program on the mobile device usually done using Nokia PC program for the SIS files through the USB cable.

But in our project the debug of the code will create an exe file , this file is not compatible with symbian mobile device ,this will cause a problem when we run task manager , to solve this problem we had to use one of the following solutions to convert (exe) file to (sis) file :

1. SymbExec

   A program which use to run the exe files on the mobile device that as we mentioned that the symbian devices can't run these type of files.

2. PC Suite

   The second way to solve his problem is transform the exe file to SIS file and that can be done using a license for the Visual Studio to able it to do that.

5.2.1.2 Classes ,Functions and Methods:

This section contains detailed information about the classes , functions , and methods that we used , and describe their tasks :

Now we will start with the class :

- **PROCESSENTRY32 class:**

The main class that used in the project to implement the variables needed in the code .

- **System.BitConverter class.**

This class used to converts base data types to an array of bytes, and arrays of bytes to base data types.

- **System.Text.Encoding class:**

This class used to conversion of the string data type

- **Process class :**

This class will utilize the functionality of the PROCESSENTRY32 class we have just created and hide the complexity of calling the Windows CE API from the client.

Now we will list functions :

- **CreateToolhelp32Snapshot:**

This function will takes a snapshot of the processes, the heaps, modules, and threads used by the processes. In order to retrieve information about the first process encountered in a system snapshot .

- **Process32First is used, and Process32Next**

These function used after the previous function because of return information about processes in the PPROCESSENTRY32 structure

Third part of this section is methods :

- **ToByteArray**

We use this method to take care of allocating the required memory and setting the dwSize member in the PROCESSENTRY32 class .

- **GetProcesses**

The task of this method is to populates the process list array

- **ToString**

It used to convert the function to string .

5. 3 Windowing Technique

In this section we illustrate the content the template page , we also mention the head, body, Editable Region and DIVs used on designing the template in detailed .

PHP language depend on tags as instructions and they look like
<TAG> ….. Text here…….. </TAG>

Structure of PHP template is as follow

```
<html xmlns="http://www.w3.org/1999/xhtml">
<HEAD> <!-- Head Section -->
    <TITLE>Title of the Web Page </TITLE>
</HEAD>
<BODY> <!-- Body Section -->
    <!-- Contents on Web Page  -->
</BODY>
```

```
</html>
```

Other content as Editable Region and DIVs are inserted between the body tags, we use one Editable Region in the template which we design , it is illustrated below

```
<!-- TemplateBeginEditable name="EditRegion3" -->
```

This is the start tag of the Editable Region, which contains its name (EditRegion3)

```
<!-- TemplateEndEditable -->
```

This is the end tag of the Editable Region.

Between the start and end tag of the Editable Region it must be the Div classes

Since we choose to divide web page into 9 parts, the template must contains 9 Div classes, each Div size is 240*320 pixel, the start and end tags for each Div is illustrated below :

```
<div class="part1">Content for  class "part1" Goes Here</div>
<div class="part2">Content for  class "part2" Goes Here</div>
<div class="part3">Content for  class "part3" Goes Here</div>
<div class="part4">Content for  class "part4" Goes Here</div>
<div class="part5">Content for  class "part5" Goes Here</div>
<div class="part6">Content for  class "part6" Goes Here</div>
<div class="part7">Content for  class "part7" Goes Here</div>
<div class="part8">Content for  class "part8" Goes Here</div>
<div class="part9">Content for  class "part9" Goes Here</div>
```

Each Div consists of start tag (<div class="*****">) which contains the name of the Div (*****) , and end tag (</div>) .

Between each start and end tag, must be the content of this Div, the content may be text, image, video, text field, button and so on.

The properties (height, width, float and so on) of each Div class are inserted between head tags, the following is an example of Div class property

```
.part8 {
        float: left;
        height: 320px;
        width: 240px;
}
```

This is Div named (part8), it has 320px height and 240ps width, and it is float at the left of the template.

5. 4 Flowcharts

In this section, flowcharts will be introduced to describe the task manager and windowing technique.

5.4.1 Mobile Task Manger:

To run task manager, first the mobile phone should be in the active mode, so the user must activate it, and then he must select the task manger application by entering to the menu then application and select task manger.

The application start reading the loaded processes on the mobile then the user will select the process, task manager will show its ID, and base address, if the user want to end this process he can do that by press "End Process" button ,then he can refresh processes list by clicking on "Refresh" button, user can repeat the previous operation if he want to end other processes, see figure 5.1.

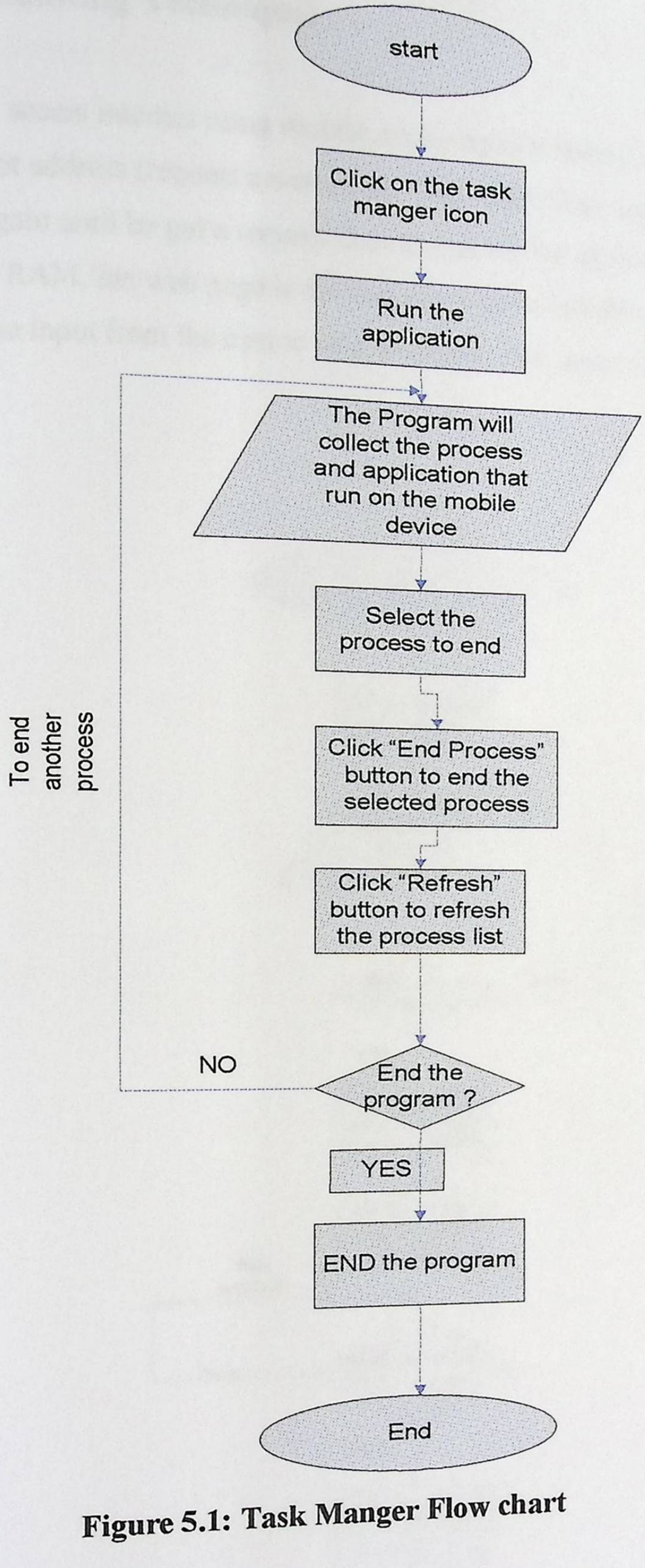

start
Click on the task manger icon
Run the application
The Program will collect the process and application that run on the mobile device
Select the process to end
Click "End Process" button to end the selected process
Click "Refresh" button to refresh the process list
End the program ?
NO
To end another process
YES
END the program
End

Figure 5.1: Task Manger Flow chart

5.4.2 Windowing Technique:

When user access internet using mobile device he first starts the mobile browser, then write the target address (request a web page), when there is no replay , user will request the page again until he got a request from the server, the mobile will load the whole page on the RAM, the web page is divided into 9 parts and then the mobile system will wait the input from the user to take an action. This steps illustrated in figure 5.2.

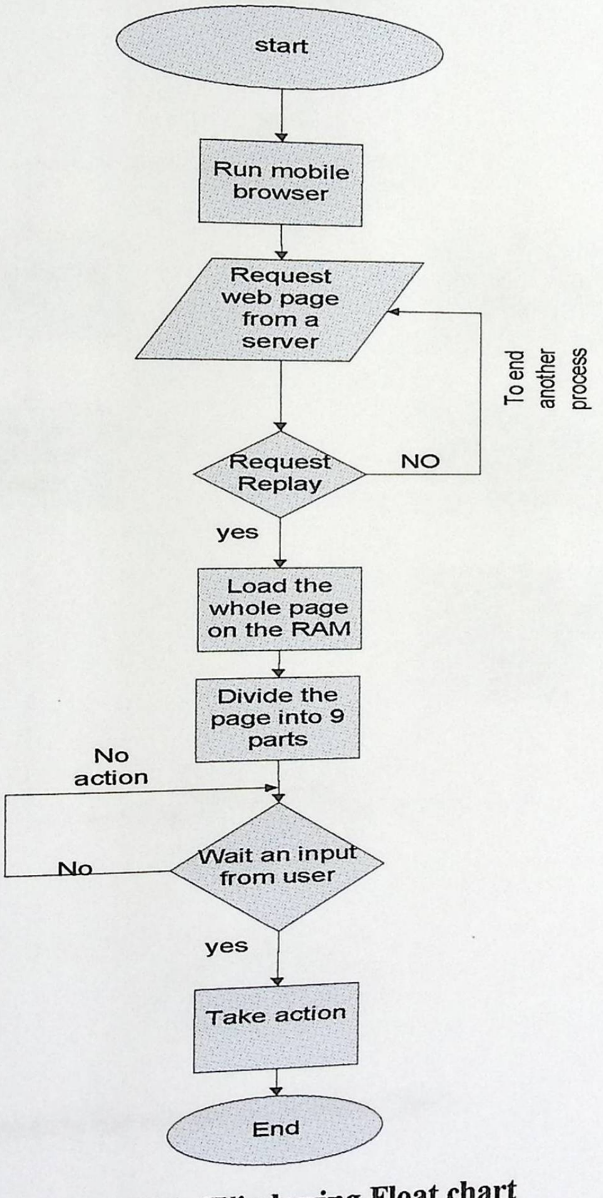


Figure 5.2: Windowing Float chart

Any web page can be accessed by both mobile devices and PCs , but the preview of the page is different between them , because of this we design a web page that can be access by both devices, if the request is from PC, the server will replay the normal page as a result ,this is shown in figure 4.12 and if the request is from mobile device the server will replay the mobile page and apply the windowing technique to this page as shown in figure 4.15 and 4.16 ,the flow chart in figure 5.3 illustrate these steps.

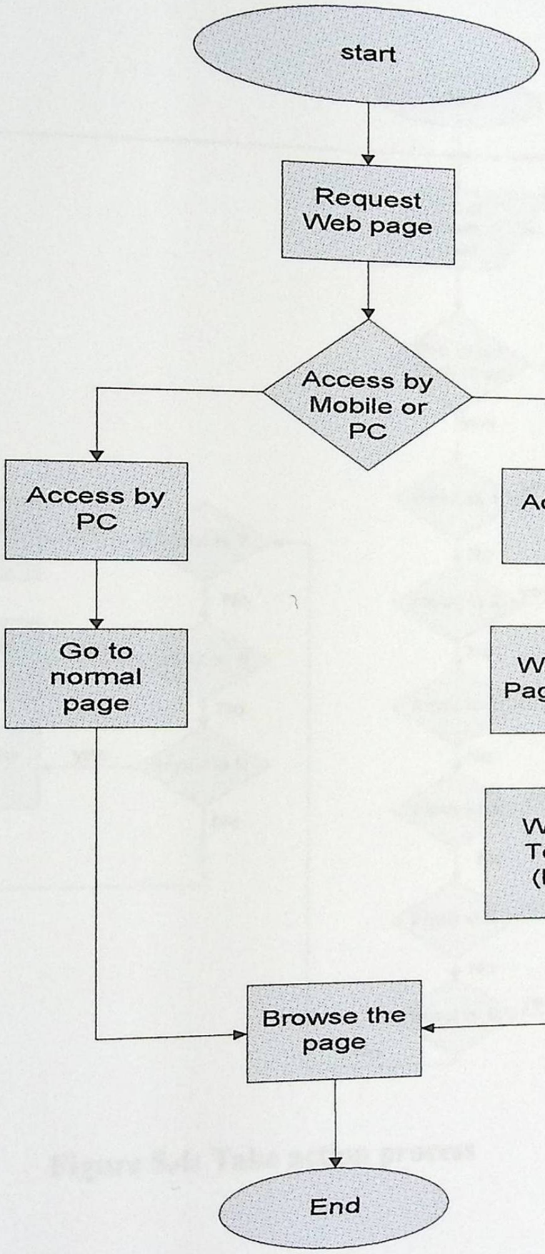


Figure 5.3: Server Request Flow chart

Now the user is give an input to the mobile system which is one of the keypad form 1 to 9 to select the target part of the web page as we can see in figure 5.4 and the system will be ready to any other user will inputs.

If there is no input from user, browser will stay waiting for an input from user, unless user end the browser. This is illustrated in figure 5.4.

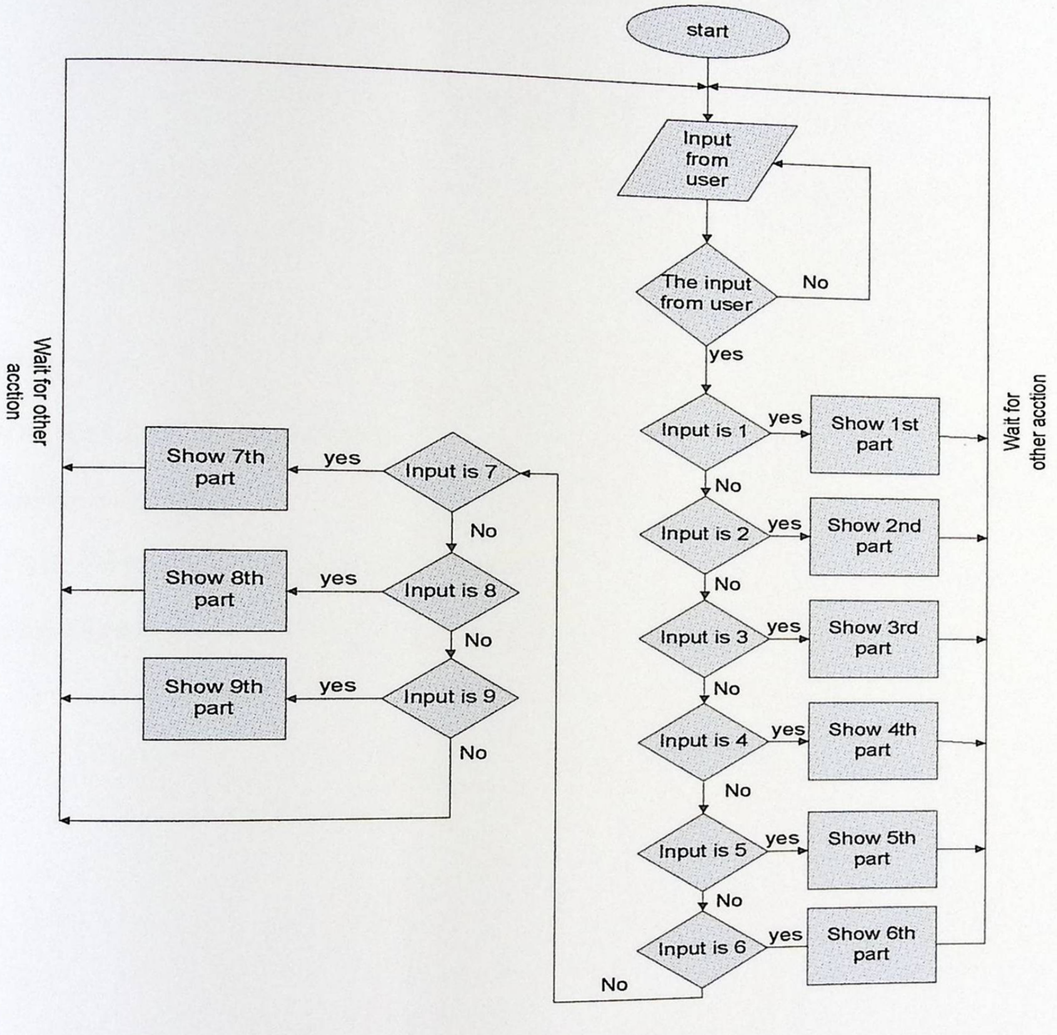


Figure 5.4: Take action process

5. 5 Summary

This chapter discussed the software system design issue, the software needed by the project, and finally the flowcharts.

CHAPTER SIX

6

System Implementation and Testing

6.1 Overview:

Testing is one of the most important phases of making any project. This phase is done at the end of the project to ensure that the system achieves its requirements and its specifications.

6.2 Project implementation:

The project will be implemented in software. The software consists of the Symbian C# program for the smart phone to create a task manger for N96 Nokia mobile, which show the process and application that run on the mobile,

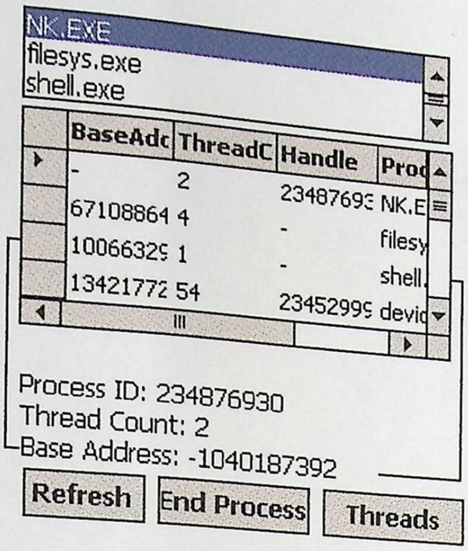
The purpose of the task manger is to end any not usfull process or application running on the mobile to make the CPU free and ready to any application or task that the user try to use .

The second part of the project is to apply windowing technique on N96 Nokia mobile to increase the performance when access the internet by divide the page into 9 parts with 240*320 pixel and that can be show in the figure 4.15.

The team project is design a web page using Dreamweaver "which used to design the web pages" to service the windowing technique since of the web designer is not sensitive that a mobile device may access their pages.

6.3 System testing:

The testing of the first part of the project which is task manger starts by install the exe file which is the output of the debugging code and run the program , the following window will appeared :



NK.EXE
filesys.exe
shell.exe

	BaseAdc	ThreadC	Handle	Proc
▸	-	2	23487693	NK.E
	67108864	4	-	filesy
	10066329	1	-	shell.
	13421772	54	23452999	devic

Process ID: 234876930
Thread Count: 2
Base Address: -1040187392

Figure 6.1:The output of Task manger program

The previous figure show a list of process that run on the mobile, using the navigation key, user can choose the process that he want to end by press the enter key, any chosen process has Process ID , Thread Count , and Base Address as shown above.

If the terminated process is important the application will give an error telling user that this process is a system process and can't be ended, else the number of the process will decreased by 1.

For example we count the running process and found that 14 running process exists, and when we end the (connmgr.exe) process , the application the program give the user that this process is a system process and can't be terminated.

Threads give an indication about the process size, so before ending any process , user can checks processes threads and then choose the process which have the largest number of threads.

The second part of the project is apply windowing technique on the N96 mobile, firstly we access a normal web page (www.ppu.edu) using a PC and found the following result

which not support the windowing technique and we find the following result:

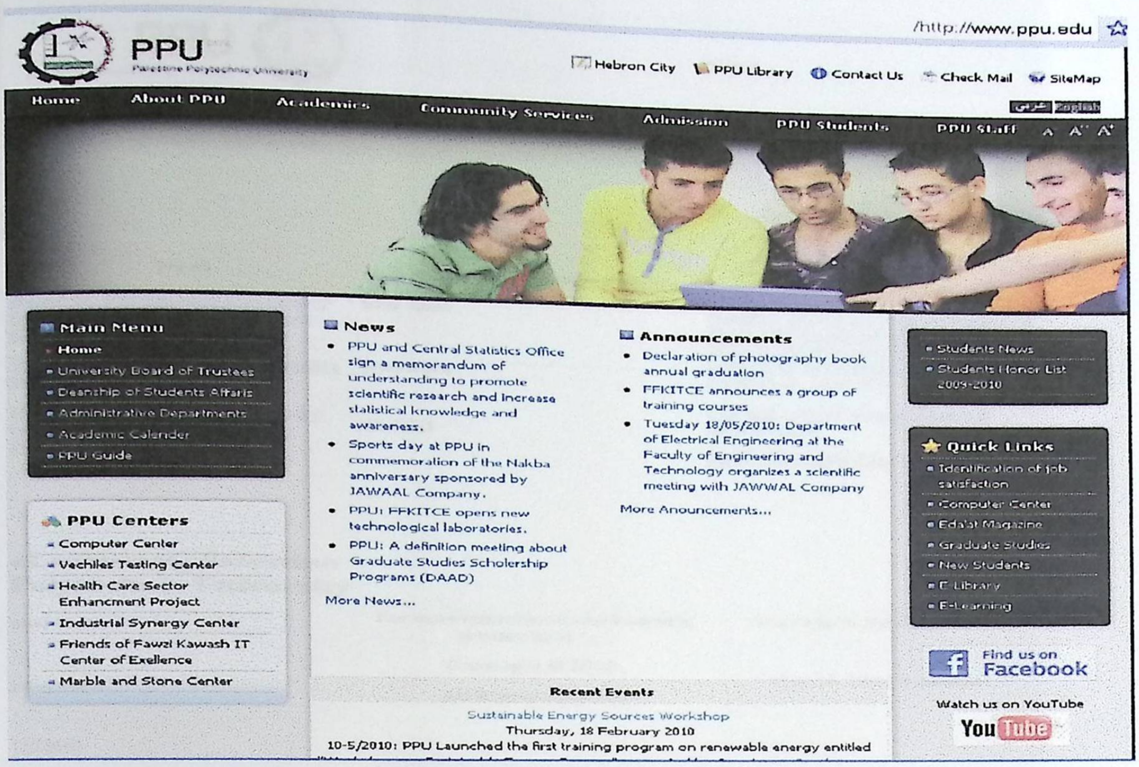


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Figure 6.2 :the result of access the internet using PC

But the access of the same page using a mobile device on the same page will appeared the following subpage

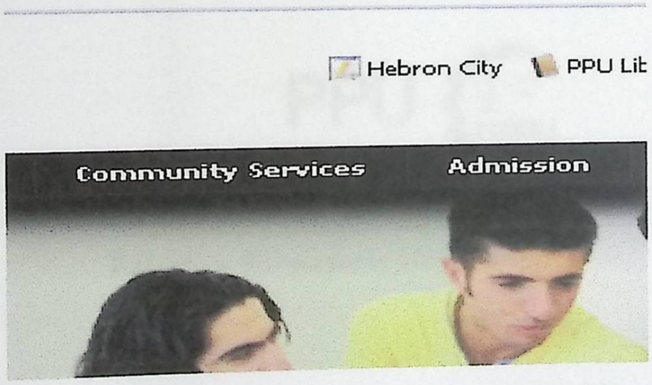

Figure 6.3 : A subpage when access by mobile

This mean that the web page is not support the windowing technique , but our web page that we design look like the figure 6.4

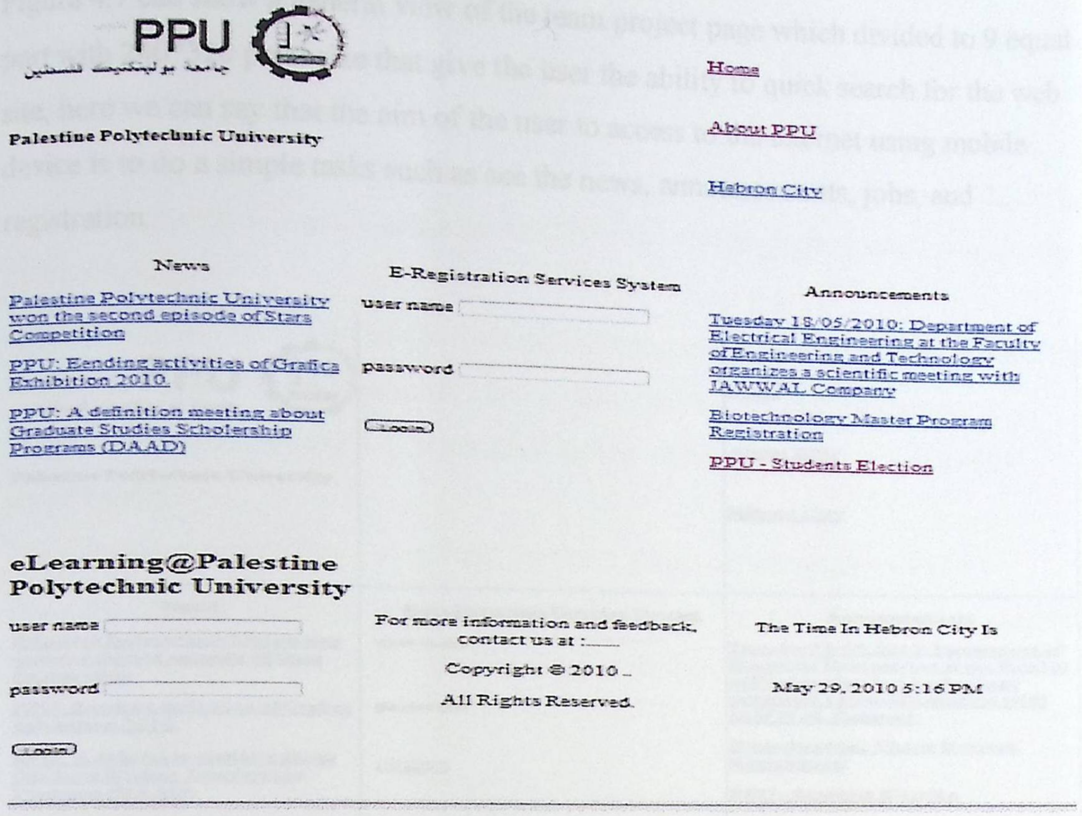
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Figure 6.4 : Project team web page

The project team page that access by the N96 mobile device give the following result:

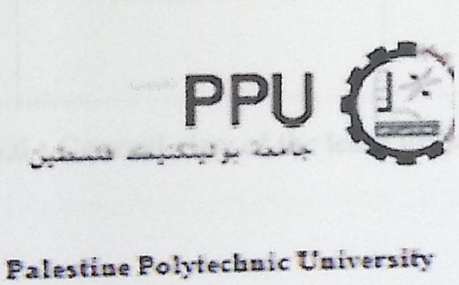
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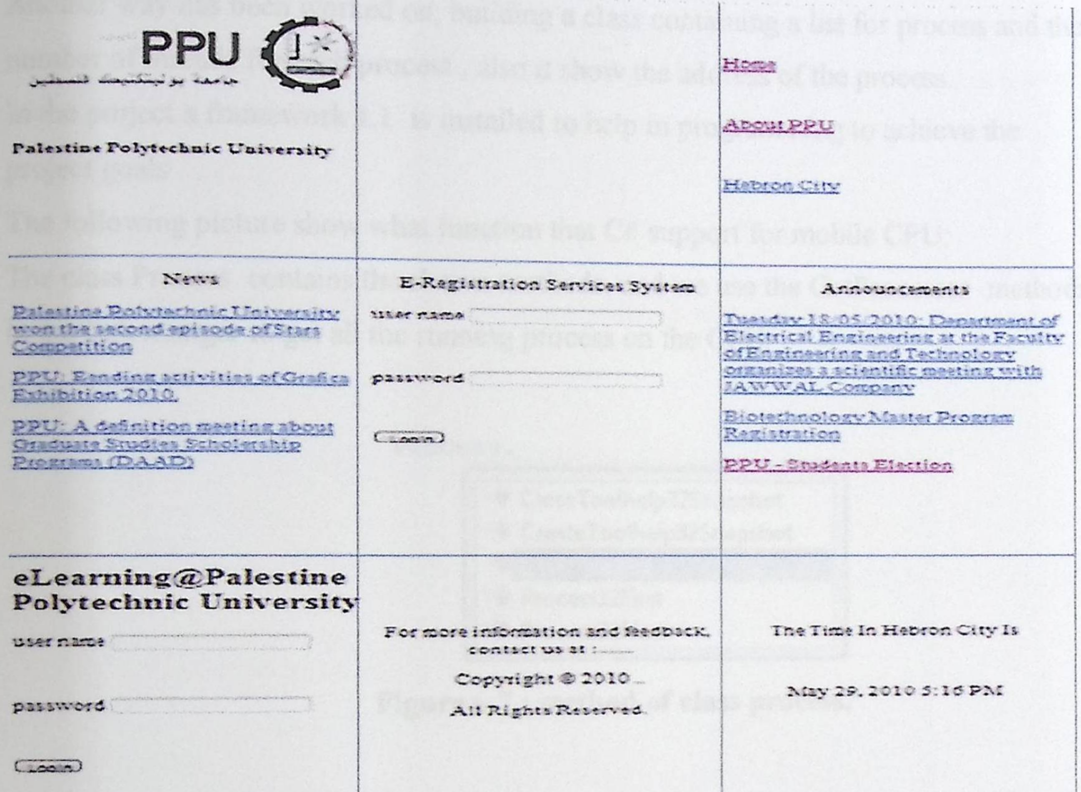
Figure 6.5: First part when access project team page

The last two figure shows that the team project page which support windowing technique will give to the user the 1st part of the page when the page is loaded to the mobile RAM.

Figure 4.7 can show a general view of the team project page which divided to 9 equal part with 240*320 pixel size that give the user the ability to quick search for the web site, here we can say that the aim of the user to access to the internet using mobile device is to do a simple tasks such as see the news, announcements, jobs, and registration.



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Home

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Figure 6.6 : General view of the team project page

6.4 Task Manager Implementations

The task manger has been rebuild for the mobile device in a way to read the process that is running on the mobile device and see how each process utilized from the mobile CPU.

And depending on the taken values a decision will be taken, to determine which process will be ended from the list of the process that running on the CPU ,expect if this process is an operating system process, then the user will be announce by an alarm that the process which he try to end it manually is an important process and ending it will effect on the performance of the mobile.

C# for Mobile Application language has been used to build this application (task manger) and get the necessary information to apply it, but a problem appear ,that is no ability to know each process usage of the CPU since C# language doesn't support the mobile functions.

Another way has been worked on, building a class containing a list for process and the number of threads for each process , also it show the address of the process.

In the project a framework 1.1 is installed to help in programming to achieve the project goals .

The following picture show what function that C# support for mobile CPU:

The class Process contains the shown methods, and we use the GetProcesses methods in the task manger to get all the running process on the CPU.

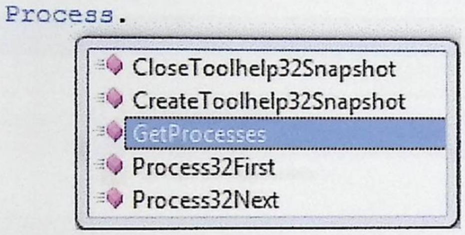


Figure 6.7 : method of class process.

A variable proc from the Process class has created , the proc variable has many function can use like: Kill,ProcessName,and ThreadCount , to build the task manger, but as we seen we can't find any more information about the running process.

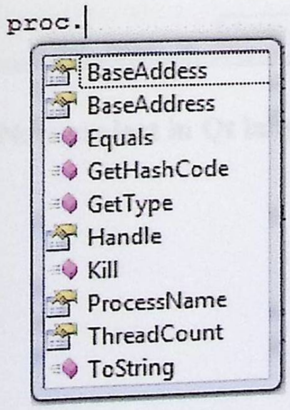
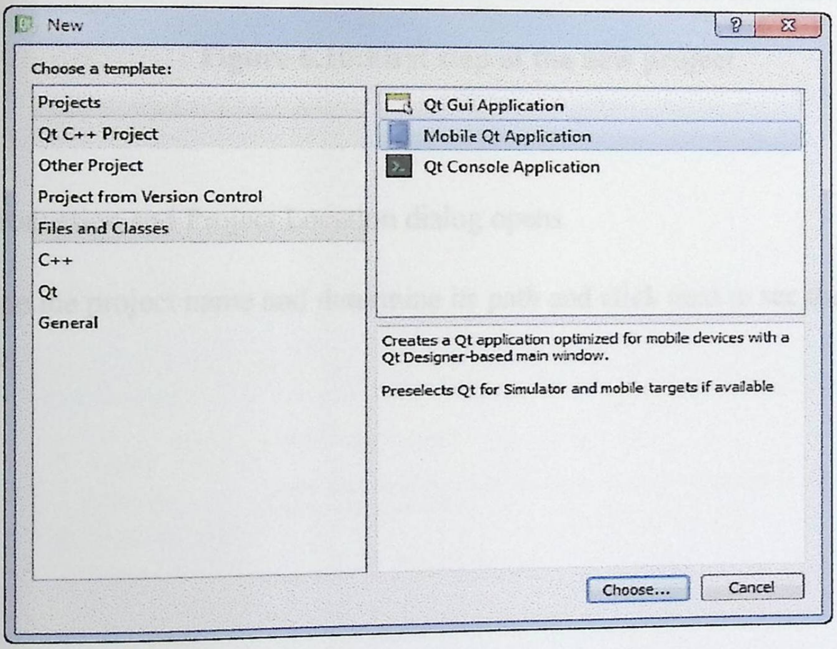


Figure 6.8 : Function of proc. variable .

Another way to solve this problem has been worked on , using VB.net to read the CPU usage of the PC, and debug the code, a (.dll) file is created by the debugging operation , this file contain the necessary information about the code of the CPU ,so the file is putted in the mobile application code as a reference in a way that give the ability to mobile application to read CPU characteristic of the mobile in C#, after debugging the code an error occurs, since the mobile application doesn't support the CPU characteristic.

Another solution that used to get the process usage of the CPU is the QT language by Nokia and that could be using drag and drop for items and then program these items using C++ language.

First we select Files and classes and chose mobile Qt application

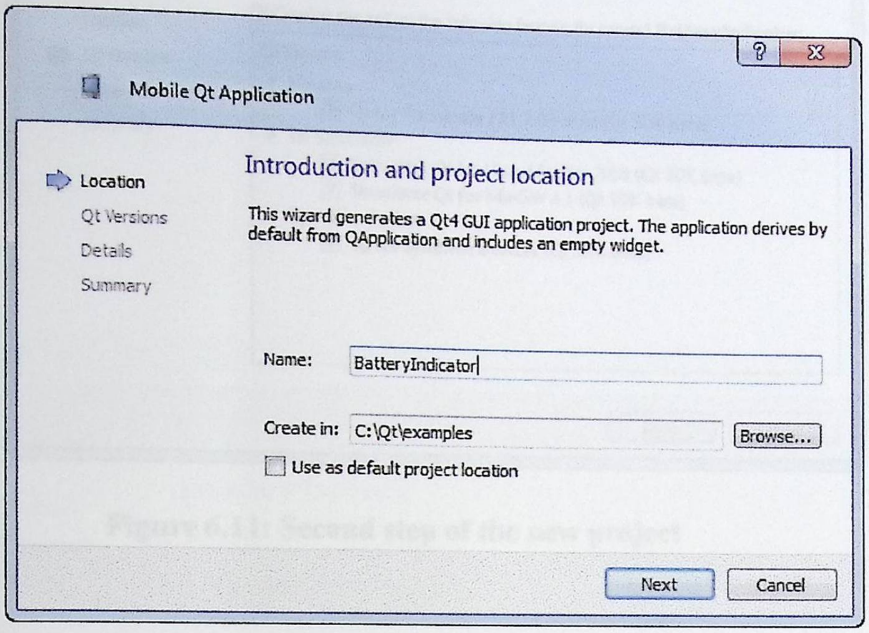


Creates a Qt application optimized for mobile devices with a Qt Designer-based main window.

Preselects Qt for Simulator and mobile targets if available

Figure 6.9 :New project in Qt language

Then push choose button and the following window will appear



Introduction and project location

This wizard generates a Qt4 GUI application project. The application derives by default from QApplication and includes an empty widget.

Name: BatteryIndicator

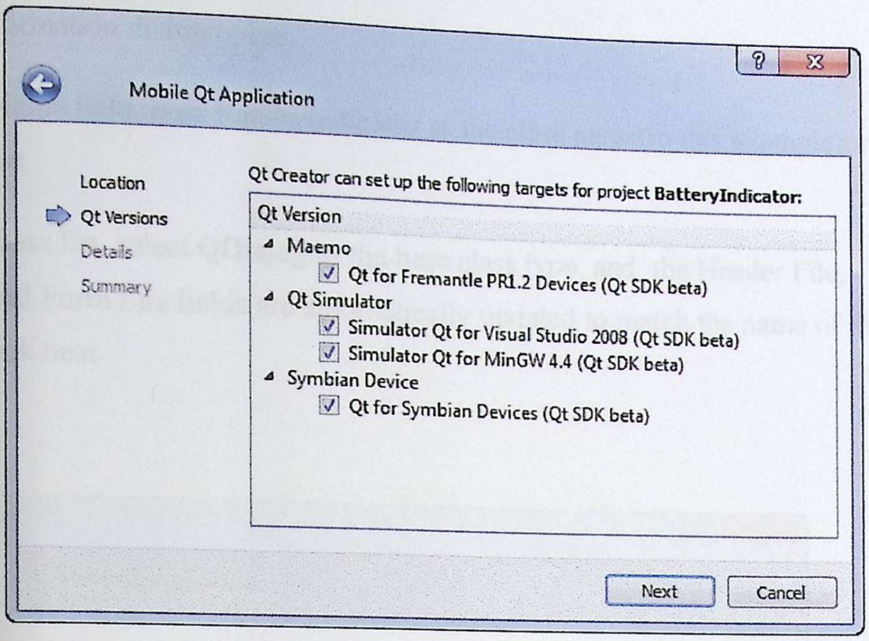
Create in: C:\Qt\examples

□ Use as default project location

Figure 6.10:First step of the new project

The Introduction and Project Location dialog opens.

Now type the project name and determine its path and click next to see the following window



Mobile Qt Application

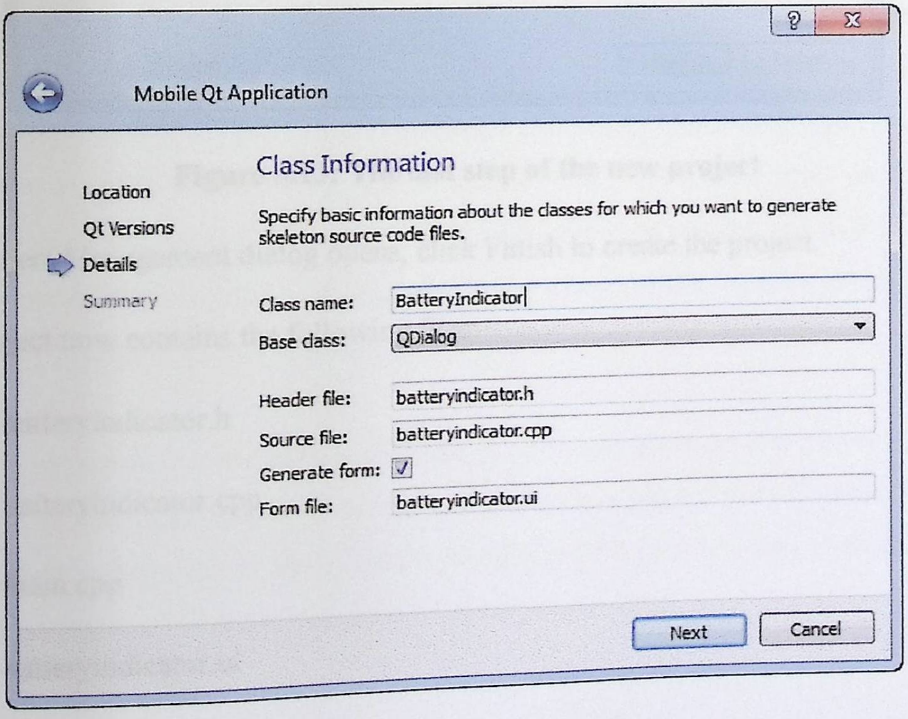
Qt Creator can set up the following targets for project **BatteryIndicator:**

Qt Version
- Maemo
  - ☑ Qt for Fremantle PR1.2 Devices (Qt SDK beta)
- Qt Simulator
  - ☑ Simulator Qt for Visual Studio 2008 (Qt SDK beta)
  - ☑ Simulator Qt for MinGW 4.4 (Qt SDK beta)
- Symbian Device
  - ☑ Qt for Symbian Devices (Qt SDK beta)

Figure 6.11: Second step of the new project

The Select Required Qt Versions dialog opens.

Select Maemo, Qt Simulator, and Symbian Device targets, and click Next.



Mobile Qt Application

Class Information

Specify basic information about the classes for which you want to generate skeleton source code files.

Class name: BatteryIndicator

Base class: QDialog

Header file: batteryindicator.h

Source file: batteryindicator.cpp

Generate form: ☑

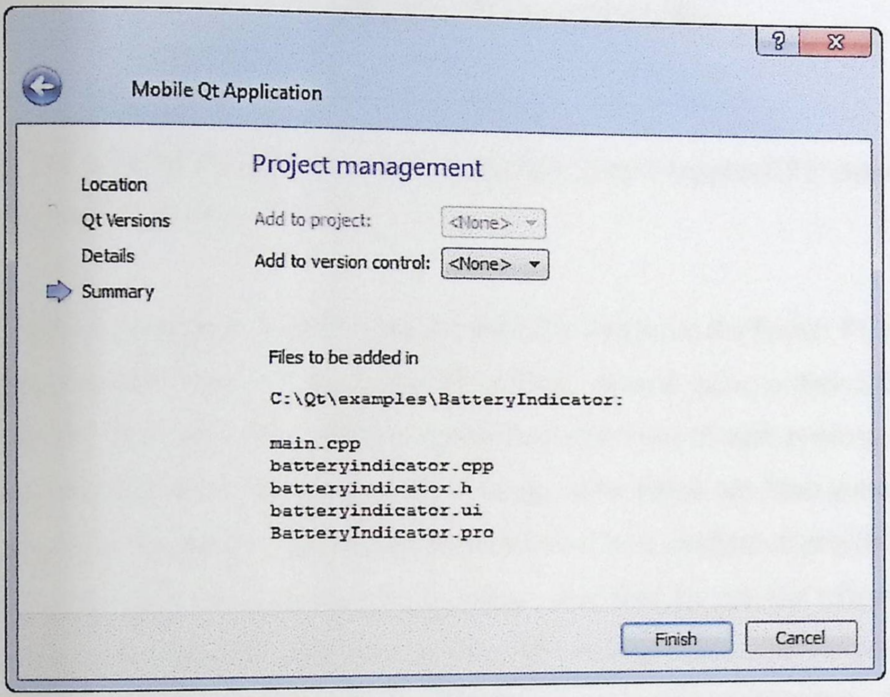
Form file: batteryindicator.ui

Figure 6.12: Third step of the new project

The Class Information dialog opens.

In the Class Name field, type BatteryIndicator as the class name(in this example)or any name you want .

In the Base Class list, select QDialog as the base class type, and the Header File, Source File and Form File fields are automatically updated to match the name of the class, then click next



Project management

Add to project: <None>

Add to version control: <None>

Files to be added in

C:\Qt\examples\BatteryIndicator:

```
main.cpp
batteryindicator.cpp
batteryindicator.h
batteryindicator.ui
BatteryIndicator.pro
```

Figure 6.13: The last step of the new project

The Project Management dialog opens, click Finish to create the project.

The project now contains the following files:

batteryindicator.h

batteryindicator.cpp

main.cpp

batteryindicator.ui

BatteryIndicator.pro

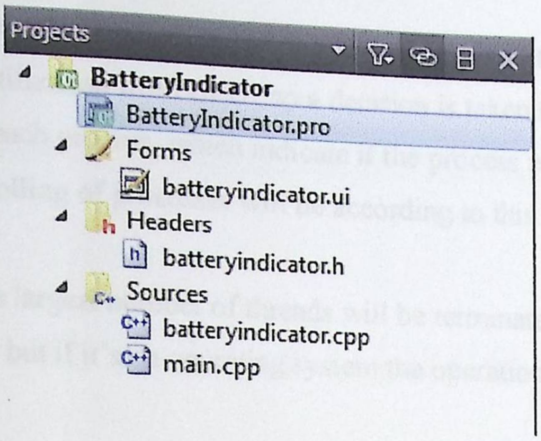


Figure 6.14:The project files

And here we face the problem that is this language doesn't support CPU characteristic and it don't have any class about it.

A new solution suggested ,which is getting the CPU usage for the Pocket PC (C# mobile application) when it's run on the PC and take several value to derive the average for CPU usage by Pocket PC , and try to find the percent use of each process when run the application on the PC device from the average value which has been gutted from the Task manger of Windows, so a related previous work in a graduation project which do the previous way has been used to get this value , then find the specific value of CPU usage as a percent value for each process from this average value , but the problem is appear again , since the project code has been build using VB.net language , there is no support for the CPU characteristic for the mobile on it ,So that the project code is rewritten from VB.net to C#, in a way help to get how each process utilize from CPU, but another problem appears , C# language doesn't support the function which has been used in the project to get CPU usage for those processes.

The big problem is that the mobile software is new , and there are few peoples who can programs mobile application , even many engineers in a big software Companies in Ramallah they can't help in this project specially in CPU characteristic such as read the running process and who each process is take from the CPU.

Accordingly and after investigation of all the previous ways , no solution has been found to get the process utilization from CPU , so a decision is taken that according to the number of threads of each process, which indicate if the process utilize big or small amount of CPU , so controlling of processes will be according to this way .

The process which has the largest number of threads will be terminated if it is not an operating system process, but if it's an operating system the operation will be cancel .

6.5 Summary

This chapter presents the testing result for the task manger mobile when its run on the N96 mobile device, also we sow the different view of the access to a web page between a page that support windowing technique and other which not supp

CHAPTER SEVEN 7

Conclusion and Future Work

7.1 Conclusion

7.2 Problems

7.3 Future work

7.1 Conclusion

In this project, we have done quite a number of things. We have studied the characteristics and behavior of Symbian OS and also learned how to program applications used in Symbian OS. Furthermore, we studied several topics and technologies that are integral to our project.

The most significant issues on this project were the communication, training, and documentation of our larger efforts. Communication with each other among the group member was extremely vital. Documentation needing to be available and complete at the end project took a great deal of time to plan for and complete it.

Building this project was important because we have combined numerous things that we learned over five years at PPU. We were able to design, build, and implement the project while utilizing a wide variety of developed skills.

This project was a challenge for us, yet we were able to use a lot of things that we have learned to solve the problems and come up with solution to make this system work.

There are big differences between the theoretical and real world implementations. And by the end of the project we achieved the goal of our project.

7.2 Problems

For any project, it is the nature of things to face problems, especially when you want to decide on and utilize a new technology. Nevertheless, we were able to cover all of the difficulties we faced, and in the end solve all of the problems.

The biggest problem that we faced during the system implementation was during the first semester when we had to decide on using J2ME. But in the end, because of its limitations which there is no existence for libraries that support the CPU of the mobile, we decided to change this idea to use C#. This action was taken at the beginning of the second semester.

But after we discussed the project in the second semester 2010, and try to develop the project we found that we can't get any more information about CPU in C# language , and work at finding another solutions as cleared in section 6.4.

Another problem encountered during the testing of the system was that when we request a web page from mobile, there is no replay from the server, so we reserve a web site on hosting server, this site is the example which is taken on the project.

7.3 Future work

We tried our best to choose the rational design to achieve the objectives of our project. We also believe that any work cannot reach perfection. Still, a lot of thought and ideas can further be utilized to enhance the current results achieved. Some of these ideas are:

By using task manager, we can affect on mobile device power side, as an important side, if we return to chapter 2, exactly figure 2.7, we can see that each process dissipate a certain amount of mobile power, which have been supplied by its battery.
If we can determine that there is a process have been run by mobile, which is not important and on the same time dissipate high amount of power, then we can terminate it. By this we can decrease power dissipation and increase mobile performance, the following steps illustrate this method:

1- Arrange the processes among to their power dissipation.
2- Check those processes importance for operating system and user

```
For (each process)
If (power dissipation is high) then
        { if (not important) then
          Terminate this process}
else  don't terminate it.
```

An improvement can be made on windowing technique is to use rest buttons on mobile keypad (* , # and 0) for additional options, for example showing the whole page when user press (*), end the browser when press (#) and give the ability to user to request a new page when he press (0).

Another suggested future work related to windowing technique is to build a technique that convert the normal web page in way to make it compatible with mobile devices , the server must check if the user access a web page by mobile device, then server convert the page to mobile web page, that supports windowing technique to reach windowing goals which pointed in previous chapters.

Also to increase performance in web browser , the web pages designers can use a way that display the page in sequential way , like converts the web page in a horizontal parts , each part has a width equal to the width of the mobile device and the user can browse the page using up and down buttons .

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