# A MALAY LANGUAGE-BASED VISUAL PROGRAMMING ENVIRONMENT FOR PERSONAL DIGITAL ASSISTANT

**By**

**SAZLY BIN ANUAR**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirement for the Degree of Master of Science**

**July 2007**

# DEDICATION

*I want to dedicate this thesis to my dearest family, especially my beloved wife, Mrs. Salfarina Abdullah, my dearest son, Mr. Iman Raziq and my lovely daughter, Ms. Iman Nuryasmin for their care, patient and love throughout my studies.*

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment
of the requirement for the degree of Master of Science

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**Chairman:** **Associate Professor Md. Nasir bin Sulaiman, PhD**

**Faculty:** **Computer Science and Information Technology**


The research in the field of Visual Programming Language (VPL) is becoming more

popular with the increase of computer speed and the graphics capabilities in recent

years. A VPL programmer creates a program by connecting a picture or icon that will

produce a directed graph, which will show the flow of the program in Visual

Programming Environment (VPE). Since the number of today programmers as well

as Personal Digital Assistant (PDA) users is rapidly increasing, it seems natural to

create a VPE for the PDA. However, most of the programming environments

developed for programming directly on PDA are classical textual programming.

Another issue in VPE research is lack of concern on graph visualization. Most of the

time, the graph layout is disorganized, hence causes difficulties for the user to

understand the flow of the graph or program. Moreover, the small screen size of

PDA has also becoming one of the main constraint factors. This research proposes

the first Malay language-based VPE on PDA. The syntax and the semantics of visual

environment are grammatically designed based on the visual programming. Graph

grammar approach is used to describe the syntax for each component. Optimizing the graph layout is another main concern in this research. The hierarchical layout technique is used to optimize the graph produced, so that it can suit on limited size of the PDA screen. It is used because it has proved as the best way in arranging nodes and edges of a graph that will show the flow of the program. Two experiments were carried out in this research. First is the testing on MaVi Environment, which is done to prove that it can be executed on PDA and produces expected output. Second is the graph layout aesthetics testing, which is done to prove that the optimization of graph layout makes it more organized compared to the original graph layout. Both testing yield promising result and thus prove the objectives of the research have been achieved.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Master Sains

## PERSEKITARAN PENGATURCARAAN VISUAL BERASASKAN BAHASA MELAYU UNTUK PEMBANTU PERIBADI DIGITAL

Oleh

**SAZLY BIN ANUAR**

**Julai 2007**

**Pengerusi:** **Profesor Madya Md. Nasir bin Sulaiman, PhD**

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Penyelidikan di dalam bidang Bahasa Pengaturcaraan Visual (VPL) telah menjadi semakin popular berikutan peningkatan kelajuan komputer dan keupayaan grafik sejak beberapa tahun kebelakangan ini. Seorang pengaturcara VPL membangunkan aturcara dengan menghubungkan gambar atau ikon yang akan menghasilkan graf terarah yang menunjukkan aliran aturcara di dalam Persekitaran Pengaturcaraan Visual (VPE). Memandangkan bilangan pengaturcara dan pengguna Pembantu Peribadi Digital (PDA) pada hari ini semakin bertambah, adalah sesuai untuk mencipta VPE untuk PDA. Walaubagaimanapun, kebanyakan persekitaran pengaturcaraan yang dibangunkan secara terus menggunakan PDA adalah pengaturcaraan klasik berasaskan tekstual. Isu lain di dalam penyelidikan VPE adalah kurangnya perhatian terhadap visual ke atas graf. Selalunya, hamparan graf adalah tidak tersusun, yang mengakibatkan kesukaran bagi pengguna untuk memahami aliran sesebuah graf atau aturcara. Tambahan pula, saiz skrin PDA yang kecil juga telah menjadi salah satu faktor kekangan yang utama. Penyelidikan ini mencadangkan sebuah VPE berasaskan bahasa Melayu yang pertama untuk PDA.

Sintak dan semantik bagi persekitaran visual dari segi tatabahasanya adalah direka berdasarkan pengaturcaraan visual. Pendekatan tatabahasa graf digunakan untuk menerangkan sintak bagi setiap komponen. Mengoptimumkan hamparan graf juga adalah salah satu urusan utama di dalam penyelidikan ini. Teknik hamparan berhirarki digunakan untuk mengoptimumkan graf yang terhasil supaya ia boleh disesuaikan dengan saiz skrin PDA yang amat terhad. Teknik ini dipilih kerana ia telah terbukti sebagai kaedah terbaik dalam menyusun kesemua nod dan tepi sesebuah graf yang akan menunjukkan aliran sesebuah aturcara. Dua eksperimen telah dijalankan di dalam penyelidikan ini. Pertama adalah ujikaji persekitaran MaVi, yang dijalankan untuk membuktikan ia boleh dilaksanakan dan menghasilkan output yang dijangkakan. Kedua, adalah ujikaji *'aesthetic'* hamparan graf, yang mana ia dijalankan untuk membuktikan bahawa pengoptimuman graf untuk hamparan graf menjadikan ia lebih tersusun berbanding dengan graf yang asal. Kedua-dua ujikaji menghasilkan keputusan yang membanggakan dan seterusnya membuktikan objektif untuk penyelidikan ini tercapai.

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Last but not least, my greatest thanks to all my friends who have helped me in one way or another and wish to extend my sincere appreciation and best wishes.

I certify that an Examination Committee has met on 12 July 2007 to conduct the final examination of Sazly Bin Anuar on his Master of Science thesis entitled "A Malay Language-Based Visual Programming Environment for Personal Digital Assistant" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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This thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee are as follows:


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# DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

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**SAZLY BIN ANUAR**

Date:

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