State of California

M E M O R A N D U M

Date: October 1, 1990
Reference Code: 90-54

To: PERSONNEL MANAGEMENT LIAISONS

THIS MEMORANDUM SHOULD BE DISTRIBUTED TO: PERSONNEL OFFICERS

From: **Department of Personnel Administration**
Classification and Compensation Division

Subject: Proposed specification and alternate range criteria revisions for the classes of Programmer I, Programmer I (Hispanic), Programmer II, Assistant Information Systems Analyst, and Student Assistant.

Employment of college students by State departments provides a means by which the students may gain practical experience in their professional or technical field of study, as well as providing the State with a means of recruiting and training potential employees prior to their college graduation. Neither the Minimum Qualifications nor the alternate range criteria for entry level information systems related classifications recognize this experience as qualifying.

The attached proposal provides for class specification and alternate range criteria revisions which will recognize related experience gained while enrolled as a student at a recognized college.

The item is being scheduled for adoption by the State Personnel Board on the Consent Calendar for the November 6-7, 1990, Board meeting. If you have any questions or concerns regarding the proposed changes, please contact Duella Farmer of my staff on 324-9406, no later than October 16, 1990. Comments received after this date will not be considered.

F. Tanaka

Frank Tanaka, Senior Section Manager
Classification and Compensation Division

TO: STATE PERSONNEL BOARD

FROM: DUELLA M. FARMER, Assistant Section Manager
Classification and Compensation Division

FRANK TANAKA, Senior Section Manager
Classification and Compensation Division

SUBJECT: Proposed specification revisions for the Programmer I, Programmer I (Hispanic), and Programmer II classes; revisions to the Alternate Range Criteria 060, 134 and 278.

SUMMARY OF ISSUES:

Employment of college students by State departments provides a means by which the students may gain practical experience in their professional or technical field of study, as well as providing the State with a means of recruiting and training potential employees prior to their college graduation. Neither the Minimum Qualifications nor the alternate range criteria for entry level information systems related classifications recognize this experience as qualifying. This proposal will revise the Programmer I and Programmer I (Hispanic) Minimum Qualifications to include related experience gained while enrolled as a student at a recognized college; revise the Programmer II Minimum Qualifications to add an early entry examination competition feature for Pattern III, which requires equivalent to a Master's degree in Computer Science; and revise the alternate Range B criteria for the Programmer I, Programmer I (Hispanic), and Assistant Information Systems Analyst classes to recognize as qualifying related experience gained while enrolled as a student at a recognized college. A minor change will also be made to the alternate Range D criteria for the Student Assistant class to provide for students who have completed one year of upper division work including at least twelve semester hours of management information systems or computer science related courses.

CONSULTED WITH:

CALIFORNIA FORUM ON INFORMATION TECHNOLOGY (CFIT), AD HOC COMMITTEE ON PERSONNEL:

JOE GONZALES, Department of Personnel Administration
ROBERT DEL AGOSTINO, Teale Data Center
MARILYN MICHAELS, Employment Development Department
LEE KINCANNON, Student Aid Commission
RON KUHNEL, Dept. of Finance, Office of Information Technology
ED ALLEN, State Personnel Board

KATHY HANSEN, State Personnel Board

RICK McWILLIAM, Department of Personnel Administration

GEORGE KARRER, CSEA, UNIT 1. In accordance with the terms of the DPA/CSEA contract, DPA has notified the CSEA in writing of the proposed action.

CLASSIFICATION CONSIDERATIONS

The scope and nature of agency uses of information technology have changed significantly during the last few years. In addition to the major data centers, many agencies operate smaller computer facilities. Also, the personal computer has become a commonplace tool within State government and many agencies have or are in the process of implementing local area networks. Departments have found it increasingly difficult to recruit qualified individuals for the entry level classes in the field of information technology.

Most of the State's data processing facilities employ college students either as Student Assistants or through contracts with the colleges or universities. While the work performed by students varies from one agency to another, students are assigned progressively more responsible programming, analysis, or technical support responsibilities. Students employed and trained by the State or by private industry during college, however, are not given credit for this experience and training towards meeting the Minimum Qualifications or alternate range criteria for the entry level information systems classifications. The private sector recognizes and compensates for this experience and training through higher level position appointments. The revisions being proposed for the Minimum Qualifications and Alternate Range B Criteria for Programmer I and Programmer I (Hispanic), and the Alternate Range B criteria for Assistant Information Systems Analyst, will recognize as being qualifying that related experience gained while enrolled as a student at a recognized college, thus making the State of California a more competitive employer.

Student Assistant--Minor revisions are being proposed to the alternate Range D experience to provide for acceptance of management information systems or computer science related courses as meeting the requirements for Range D.

Programmer I and Programmer I (Hispanic) - College graduates with an applied science major meet the requirements for Programmer I, and meet the criteria for payment at Range B. Student Assistants who do not complete their college meet the minimum qualifications for Programmer I, Range A, with 16 semester units related to data processing, or 12 months programming experience, or 6 months programming experience and 9 units related to data processing. Range B criteria requires six months programming experience equivalent to Programmer I, Range A. It is proposed to add a statement to the specification immediately following the experience patterns which will accept experience gained while enrolled as a student in a recognized college toward meeting this requirement based on 1000 hours being equal to six months. This same statement will be added as an alternate criteria for Range B. It is also proposed to delete from the Minimum Qualifications the examples of Cobol and Fortran as acceptable programming languages, due to the variety of programming languages which are in use today.

Programmer II--Pattern III of the Minimum Qualifications requires the equivalent to a Master's Degree in Computer Science. It is proposed to add a statement which will admit persons to the examination who are within six months of meeting this requirement. Evidence of completion of this requirement will have to be submitted before applicants can be considered eligible for appointment.

Assistant Information Systems Analyst, Range B criteria - Prior to May, 1989, the State used the Staff Services Analyst generalist class as the entry level college recruitment class for the professional Data Processing classes. In May 1989, the Assistant Information Systems Analyst class was established as a means of recruiting college graduates with a minimum of 24 semester or 36 quarter units in management information systems or computer science courses. Student Assistants who complete their college graduation with 24 units related to data processing meet the Minimum Qualifications for Assistant Information Systems Analyst, Range A. The current Range B criteria includes an open pattern of six months of experience performing a variety of tasks in the analysis, development, installation, implementation, procurement or support of electronic information processing systems in addition to the educational requirements stated on the specification. It is proposed to add a second open experience pattern which would accept experience gained while enrolled as a student in a recognized college in providing a variety of programming, analysis, or technical support responsibilities. Persons who graduate and are hired into the Assistant Information Systems Analyst class will now be able to apply experience gained while enrolled as a student in a recognized college towards the alternate range criteria requirements for Range B.

EMPLOYEE STATUS CONSIDERATIONS:

The Student Assistant and Graduate Student Assistant classes are seasonal, nontesting, and no permanent appointments are made; therefore there are no status considerations.

However, departments need to review individual experience/education backgrounds to determine which employees meet the revised alternate range criteria. Employees meeting any of the revised criteria may be moved to the appropriate new range at the discretion of the departments.

RECOMMENDATIONS:

1. That the proposed revised specifications for the following classes as shown in this calendar be adopted.

   Programmer I
   Programmer I (Hispanic)
   Programmer II

2. That the proposed revisions to Alternate Range Criteria 060 for the class of Student Assistant as shown in this calendar be adopted.

3. That the proposed revisions to Alternate Range Criteria 134 for the class of Programmer I and Programmer I (Hispanic) as shown in this calendar be adopted.

4. That the proposed revisions to Alternate Range Criteria 278 for the class of Assistant Information System Analyst as shown in this calendar be adopted.

ALTERNATE RANGE CRITERIA 060
(STUDENT ASSISTANT)

Employees shall be moved to the rate in the higher salary range under the provisions of Section 599.676 upon submission of proof that the requirements for the particular criteria have been met.

Range A. Enrollment as a student in a college or university with lower division undergraduate standing. (Lower division typically refers to freshmen or sophomores who have completed no more than 60 semester units acceptable toward graduation.)

Range B. Enrollment as a student in a college or university with upper division undergraduate standing. (Upper division typically refers to juniors or seniors who have completed not less than 60 nor more than 120 semester units acceptable toward graduation.)

Range C. Enrollment as a student in a college or university with upper division undergraduate standing (upper division typically refers to juniors or seniors who have completed not less than 60 nor more than 120 semester units acceptable toward graduation) and a minimum of 500 hours work experience in a student program in the California state service. (The State College and University school systems are typically excluded from the California State service.)

Range D. Evidence of successful completion of one year of upper division work in accounting, business administration, economics, or related fields including either (1) at least twelve semester hours of courses related to fiscal management such as elementary and advanced accounting, auditing, cost accounting, or business law; or (2) at least twelve semester hours of courses related to management information systems or computer science.

or

Evidence of successful completion or more than 120 semester units acceptable toward graduation and proof of application for enrollment in supplemental college course work;

or

A minimum of 1,000 hours of experience in a student program in the California State service. (The State College and University school systems are typically excluded from the California State service.)

ALTERNATE RANGE CRITERIA 134
PROGRAMMER I
PROGRAMMER I (HISPANIC)

When the requirement for the particular criteria are met and upon recommendation of the appointing power, the employee shall receive a rate under the provisions of Section 599.674.

Range A. This range shall apply to incumbents who do not meet the criteria for payment in Range B.

Range B. This range shall apply to persons who have either:

(1) satisfactorily completed six months of experience equivalent to that of Programmer I, Range A, or Programmer I (Hispanic), Range A. (This experience must be beyond that which is required to satisfy the "Minimum Qualifications" for the Programmer I classes.)

or

(2) Experience performing similar programming duties while enrolled as a student at a recognized college may be applied toward meeting this requirement based on 1000 hours being equal to six months. (This experience must be beyond that which is required to satisfy the "Minimum Qualifications" for the Programmer I classes.)

or

(3) completed the equivalent to graduation from college with major work in an applied science such as mathematics, engineering, physics, statistics, or computer science.

ALTERNATE RANGE CRITERIA 278
(ASSISTANT INFORMATION SYSTEMS ANALYST)

Experience gained outside State service may be credited only if the appointing power believes the experience was satisfactory and comparable in type and quality to that of Assistant Information Systems Analyst.

When the requirements for the particular criteria are met and upon recommendation of the appointing power, the employee shall receive a rate under the provisions of Section 599.674 except that upon movement to Range C, the provisions of Section 599.676 will apply.

RANGE A: This range shall apply to those individuals who do not meet the criteria for Range B or Range C.

RANGE B: This range

(1) shall apply to persons who have satisfactorily completed the equivalent of six months of Assistant Information Systems Analyst (Range A) in the California state service; or

(2) may apply to persons who have the equivalent of six months of satisfactory experience outside of State service performing a variety of tasks in the analysis, development, installation, implementation, procurement or support of electronic information processing systems with duties equivalent in complexity and type to those of an Assistant Information Systems Analyst; AND who meet the education requirements as stated on the class spec; or

(3) <u>May apply to persons who, while enrolled as a student at a recognized college, have satisfactorily completed the equivalent of six months (1000 hours) of work experience performing programming, analysis, or technical support duties; AND who meet the education requirements as stated on the class spec.</u>

RANGE C: This range:

(1) shall apply to persons who have satisfactorily completed the equivalent of 12 months of Assistant Information Systems Analyst (Range B) or 18 months of Assistant Information Systems Analyst experience in the California state service; or

(2) may apply to persons who have the equivalent of 18 months of satisfactory experience outside of State service performing a variety of tasks in the analysis, development, installation, implementation, procurement or support of electronic information processing systems with duties equivalent in complexity and type to those of an Assistant Information Systems Analyst; <u>AND</u> who meet the education requirements as stated on the class spec; or

(3) may apply to persons who have 30 semester or 45 quarter units of graduate work in management information systems or computer science related courses; <u>AND</u> who meet the education requirements as stated on the class spec.

C A L I F O R N I A S T A T E P E R S O N N E L B O A R D

SPECIFICATION

Schematic Code:	LM34
Class Code:	1382
Established:	9/18/80
Revised:	10/3/84
Title Changed:	--

PROGRAMMER I

DEFINITION

Under close direction, to plan and develop programs to be processed by electronic ~~data~~ information processing equipment; under close supervision, to perform systems analysis or systems programming (software) work; and to do other related work.

JOB CHARACTERISTICS

The class of Programmer I is a recruiting and developmental class for persons qualified to perform programming, analysis and systems programming tasks as a background for advancement in State service. Incumbents are assigned duties and responsibilities commensurate with their background and training.

Positions are permanently allocated to this class when the major portion of the functions inherent in the position do not include the more responsible, varied and difficult assignments found at the journey person programmer level.

TYPICAL TASKS

Receives on-the-job training in programming and data processing to develop competency; determines the logical order in which processes should be manipulated in a program or system and produces any necessary documentation; develops arrangement of programs within the system, master file layouts, report layouts, etc., based on general system design needs; receives assignments in oral or written form to develop new computer programs and to modify existing programs within a system; reviews and analyzes assignments to resolve any deficiencies or problems in producing the specified output; develops computer application programs, programs segments, file descriptions, and record layouts based on comprehensive programming specifications; develops program logic, utilizing programming tools; writes program code using appropriate computer languages and access methods; assembles and compiles

programs to identify coding errors; corrects (debugs) logic and compilation errors in programs; develops test plans and executes tests for accuracy in the processing of data.

MINIMUM QUALIFICATIONS

Either I

Successful completion of 18 semester units or 378 hours of academic courses in computer science or ~~data~~ information processing provided by either a college or university, a State agency, or a vocational institution, including a minimum of six semester units or 162 hours of programming courses including laboratory work ~~in acceptable programming languages such as COBOL or FORTRAN~~. (Persons who will complete the required course work outlined above during the current semester will be admitted to the examination but they must produce evidence of successful completion of the prescribed courses before they may be considered eligible for appointment.)

Or II

One year of experience performing programming tasks ~~using an acceptable programming language such as COBOL or FORTRAN~~. Experience performing similar programming duties while enrolled as a student at a recognized college may be applied toward meeting this requirement based on 1000 hours being equal to six months. (Programming experience as a hobbyist or for personal use is not considered qualifying experience under this Pattern.)

Or III

Six months of experience performing programming tasks ~~using an acceptable programming language such as COBOL or FORTRAN~~. Experience performing similar programming duties while enrolled as a student at a recognized college may be applied toward meeting this requirement based on 1000 hours being equal to six months. (Programming experience as a hobbyist or for personal use is not considered qualifying experience under this Pattern.) and

Successful completion of nine semester units or 216 hours of academic courses in computer science or ~~data~~ information processing provided by either a college or university, a State agency, or a vocational institution, including a minimum of six semester units or 162 hours of programming courses including laboratory work ~~in acceptable programming languages such as COBOL or FORTRAN~~. (Persons who will complete the required course work outlined above during the current semester will be admitted to the examination but they must produce evidence of successful completion of the prescribed courses before they may be considered eligible for appointment.)

Or IV

One year of experience as a ~~Data Processing~~ Information Systems Technician (Range B) or an Occupational Technician (General)

(Range B) in the California state service performing ~~data~~ information processing duties that include writing job control language or its equivalent. and

Successful completion of nine semester units or 216 hours of academic courses in computer science or ~~data~~ information processing provided by either a college or university, a State agency or a vocational institution, including a minimum of six semester units or 162 hours of programming courses including laboratory work ~~in acceptable programming languages such as COBOL or FORTRAN~~. (Persons who will complete the required course work outlined above during the current semester will be admitted to the examination but they must produce evidence of successful completion of the prescribed courses before they may be considered eligible for appointment.)

KNOWLEDGE AND ABILITIES

Knowledge of: Principles and procedures of computer programming; general operating principles, capabilities and limitations of electronic ~~data~~ information processing equipment; use and application of programming languages ~~such as COBOL, FORTRAN, etc.~~, and job control language and assembly language; a variety of base arithmetics (binary, hexadecimal, etc.).

Ability to: Use programming principles and procedures; use programming languages ~~such as COBOL, FORTRAN, etc.~~; use programming tools and equipment; present solutions to problems with clarity and precision in written and/or graphic form; compose structured computer programs; write clear and concise narrative statements and draw logical diagrams; detect, analyze and correct errors in programs; learn new programming languages; analyze work systems into logical components; suggest alternative systems to reflect user requirements and constraints; communicate effectively; reason logically and creatively; analyze data and draw logical conclusions; work cooperatively with others and gain their respect and confidence.

SPECIAL PERSONAL CHARACTERISTICS

Willingness to do detailed work requiring a high degree of mental concentration: a demonstrated capacity for development as evidenced by work history, academic attainment or well-defined occupational or avocational interests, and willingness and ability to accept increasing responsibility.

ADDITIONAL DESIRABLE QUALIFICATIONS

Programming/laboratory courses in COBOL; equivalent to graduation from college.

C A L I F O R N I A S T A T E P E R S O N N E L B O A R D

SPECIFICATION

Schematic Code: LM35
Class Code: 2697
Established: 6/2/87
Revised:
Title Changed: --

PROGRAMMER I (HISPANIC)

DEFINITION

Under close direction, to plan and develop programs to be processed by electronic ~~data~~ information processing equipment; under close supervision, to perform systems analysis or systems programming (software) work; and to do other related work.

JOB CHARACTERISTICS

The class of Programmer I (Hispanic) is a recruiting and developmental class for persons qualified to perform programming, analysis and systems programming tasks as a background for advancement in State service. Incumbents are assigned duties and responsibilities commensurate with their background and training.

Positions are permanently allocated to this class when the major portion of the functions inherent in the position do not include the more responsible, varied and difficult assignments found at the journey person programmer level.

TYPICAL TASKS

Receives on-the-job training in programming and data processing to develop competency; determines the logical order in which processes should be manipulated in a program or system and produces any necessary documentation; develops arrangement of programs within the system, master file layouts, report layouts, etc., based on general system design needs; receives assignments in oral or written form to develop new computer programs and to modify existing programs within a system; reviews and analyzes assignments to resolve any deficiencies or problems in producing the specified output; develops computer application programs, programs segments, file descriptions, and record layouts based on comprehensive programming specifications; develops program logic, utilizing programming tools; writes program code using appropriate computer languages and access methods; assembles and compiles

programs to identify coding errors; corrects (debugs) logic and compilation errors in programs; develops test plans and executes tests for accuracy in the processing of data.

MINIMUM QUALIFICATIONS

Either I

Successful completion of 18 semester units or 378 hours of academic courses in computer science or ~~data~~ information processing provided by either a college or university, a State agency, or a vocational institution, including a minimum of six semester units or 162 hours of programming courses including laboratory work ~~in acceptable programming languages such as COBOL or FORTRAN~~. (Persons who will complete the required course work outlined above during the current semester will be admitted to the examination but they must produce evidence of successful completion of the prescribed courses before they may be considered eligible for appointment.)

Or II

One year of experience performing programming tasks ~~using an acceptable programming language such as COBOL or FORTRAN~~. Experience performing similar programming duties while enrolled as a student at a recognized college may be applied toward meeting this requirement based on 1000 hours being equal to six months. (Programming experience as a hobbyist or for personal use is not considered qualifying experience under this Pattern.)

Or III

Six months of experience performing programming tasks ~~using an acceptable programming language such as COBOL or FORTRAN~~. Experience performing similar programming duties while enrolled as a student at a recognized college may be applied toward meeting this requirement based on 1000 hours being equal to six months. (Programming experience as a hobbyist or for personal use is not considered qualifying experience under this Pattern.) and

Successful completion of nine semester units or 216 hours of academic courses in computer science or ~~data~~ information processing provided by either a college or university, a State agency, or a vocational institution, including a minimum of six semester units or 162 hours of programming courses including laboratory work ~~in acceptable programming languages such as COBOL or FORTRAN~~. (Persons who will complete the required course work outlined above during the current semester will be admitted to the examination but they must produce evidence of successful completion of the prescribed courses before they may be considered eligible for appointment.)

Or IV

One year of experience as a ~~Data Processing~~ Information Systems Technician (Range B) or an Occupational Technician (General)

(Range B) in the California state service performing ~~data~~ information processing duties that include writing job control language or its equivalent. and

Successful completion of nine semester units or 216 hours of academic courses in computer science or ~~data~~ information processing provided by either a college or university, a State agency or a vocational institution, including a minimum of six semester units or 162 hours of programming courses including laboratory work ~~in acceptable programming languages such as COBOL or FORTRAN~~. (Persons who will complete the required course work outlined above during the current semester will be admitted to the examination but they must produce evidence of successful completion of the prescribed courses before they may be considered eligible for appointment.)

KNOWLEDGE AND ABILITIES

Knowledge of: Principles and procedures of computer programming; general operating principles, capabilities and limitations of electronic ~~data~~ information processing equipment; use and application of programming languages ~~such as COBOL, FORTRAN, etc.~~, and job control language and assembly language; a variety of base arithmetics (binary, hexadecimal, etc.).

Ability to: Use programming principles and procedures; use programming languages ~~such as COBOL, FORTRAN, etc.~~; use programming tools and equipment; present solutions to problems with clarity and precision in written and/or graphic form; compose structured computer programs; write clear and concise narrative statements and draw logical diagrams; detect, analyze and correct errors in programs; learn new programming languages; analyze work systems into logical components; suggest alternative systems to reflect user requirements and constraints; communicate effectively; reason logically and creatively; analyze data and draw logical conclusions; work cooperatively with others and gain their respect and confidence.

SPECIAL PERSONAL CHARACTERISTICS

Willingness to do detailed work requiring a high degree of mental concentration: a demonstrated capacity for development as evidenced by work history, academic attainment or well-defined occupational or avocational interests, and willingness and ability to accept increasing responsibility.

ADDITIONAL DESIRABLE QUALIFICATIONS

Programming/laboratory courses in COBOL; equivalent to graduation from college.

C A L I F O R N I A S T A T E P E R S O N N E L B O A R D

SPECIFICATION

Schematic Code:	LM36
Class Code:	1383
Established:	9/18/80
Revised:	12/16/81
Title Changed:	--

PROGRAMMER II

DEFINITION

Under general direction, to plan and develop programs to be processed by electronic ~~data~~ information processing equipment; under supervision to perform systems analysis or systems programming (software) work; and to do other related work.

JOB CHARACTERISTICS

The class of Programmer II is the journey level programming class. Incumbents are assigned duties and responsibilities commensurate with their background and training.

Positions are permanently allocated to this class when the major portion of the functions inherent in the position do not include the more responsible, varied and difficult assignments found in systems analysis, programming/analysis and systems programming (software) journey level work.

TYPICAL TASKS

Studies the principles and techniques of the area of work to which assigned and applies them; designs applications programs and routines from program specifications; codes, tests, debugs, documents, and installs applications and routines; may assist in determining and analyzing the ~~data~~ information processing needs of users, establishing the feasibility of computer solutions, and designing, monitoring and implementing systems, programs and routines; and may assist in the evaluation of proposed new or modified computer system hardware and software and the development, installation and measurement of systems programs.

MINIMUM QUALIFICATIONS

Either I

One year of experience in the California state service performing programmer duties equivalent to Programmer I, Range B. (Applicants who will meet this requirement within three months may be admitted to the examination but not appointed until the 12 months are completed.)

Or II

Experience: Eighteen months of experience equivalent to that of a Programmer I in the California state service. (California state experience applied toward this requirement must include one year at the Programmer I, Range B, level); and

Education: Equivalent to graduation from college. (Additional work experience as a programmer may be substituted for the education with six months of experience being equal to one year of education.)

Or III

The equivalent to a Master's Degree in Computer Science. Applicants who will meet this requirement within six months may be admitted to the examination, but they must produce evidence of completion of this requirement before they can be considered eligible for appointment.

Or IV

Experience: Eighteen months of experience equivalent to that of a Programmer I in the California state service; and

Education: Completion of the requirements for an associate of arts degree (60 semester units including 18 of data processing or computer science).

Or V

Successful completion of a recognized programmer apprenticeship. (Apprentices who are within six months of completion of their apprenticeship may be admitted to the examination, but they must present evidence of successful completion of their apprenticeship before they may be appointed.)

KNOWLEDGE AND ABILITIES

Knowledge of: Terms and concepts used in electronic data processing.

Ability to: Reason logically and creatively; develop electronic computer routines; analyze data and draw logical conclusions; speak and write effectively; prepare effective reports; work cooperatively with others and gain their respect and confidence.

SPECIAL PERSONAL CHARACTERISTICS

Willingness to do detailed work requiring a high degree of mental concentration; a demonstrated capacity for development as evidenced by work history, academic attainment or well-defined occupational or avocational interests, and willingness and ability to accept increasing responsibility.

ADDITIONAL DESIRABLE QUALIFICATIONS

Equivalent to graduation from college with major work in an applied science such as computer science, mathematics, engineering, physics, or statistics and knowledge of program specifications, program design, program languages, electronic computer systems including their capabilities and limitations, program testing, program documentation, and program implementation.