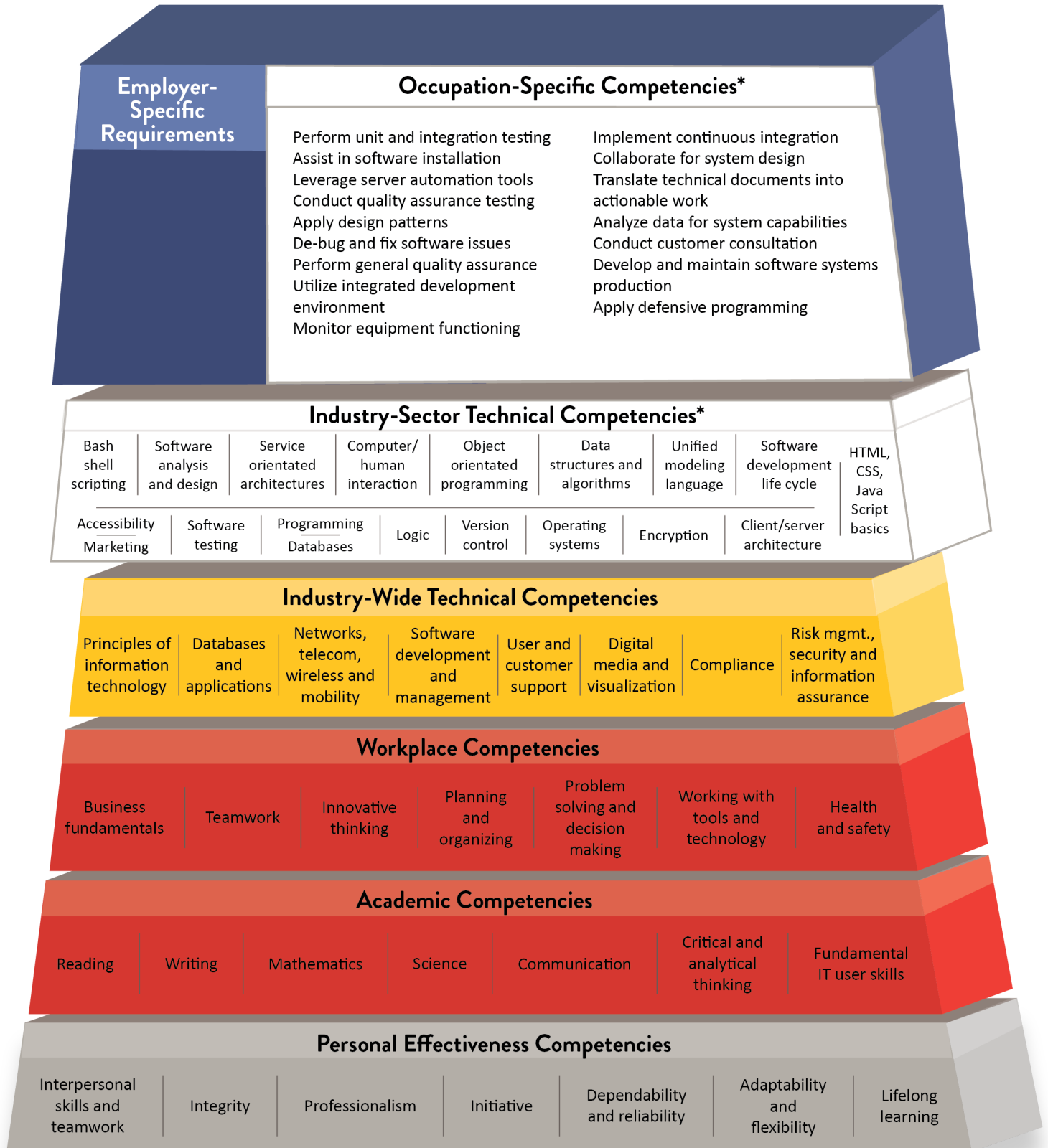


Minnesota Dual-Training Pipeline

Competency Model for Information Technology

Occupation: Web Developer



Based on: Information Technology Competency Model, Employment and Training Administration, United States Department of Labor, February 2025. For more detailed information about competency model creation and sources, visit dli.mn.gov/business/workforce/information-technology.

Competency Model for Web Developer

Web Developer Front End – A web developer is one who specializes in the development of websites and webpages with the ability to work on the human interface applications and design aspects of the website as well as the behind-the-scenes coding and programming that is required for creating a fully functioning website.

*Pipeline recommends the Industry-Sector Technical Competencies as formal training opportunities (provided through related instruction) and the Occupation-Specific Competencies as on-the-job (OJT) training opportunities.

Industry-Sector Technical Competencies

Related Instruction for dual training means the organized and systematic form of education resulting in the enhancement of skills and competencies related to the dual trainee's current or intended occupation.

- **Bash shell scripting** – Know how to script a UNIX shell or command language.
- **Software testing** – Know how to evaluate software to make sure it meets specified requirements. Also know how to identify any gaps, errors, or missing requirements for website development.
- **Software analysis and design** – Understanding of modeling and its central role in eliciting, understanding, analyzing, and communicating software requirements, architecture and design for website development.
- **Programming** – Understand how to create programs by writing “code” in certain programming language.
- **Service oriented architectures** – Understand architectural pattern in computer software design in which application components provide services to other components via a communications protocol, typically over a network.
- **Logic** – Understand the part of the program that encodes the real-world business rules that determine how data can be created, displayed, stored, and changed.

- **Object oriented programming** – Understanding this type of programming in which programmers define not only the data type of a data structure, but also the types of operations (functions) that can be applied to the data structure.
- **Databases** – Knowledge of implementing data models and database designs to ensure security and data integrity in database software for the website.
- **Version control** – Understanding of the system that records changes to a file or set of files over time so that you can recall specific versions later.
- **Data structures and algorithms** – Knowledge of the use of data structures and algorithms in web design.
- **Operating systems** – Understand the function of operating systems and how to properly create websites to interact with them.
- **Unified modeling language** – Understanding of the general-purpose modeling language for software engineering, designed to provide a standard way to visualize the design of a system.
- **Encryption** – Understanding of how encryption functions and how to work with it within the website development environment.
- **Software development life cycle** – Knowledge of Waterfall and Agile approaches to software development and when to use the appropriate model for website development.
- **Client/server architecture** – Knowledge of the client/server architecture model and how to develop websites for such a system.
- **Accessibility** – Have a basic knowledge of accessibility so that all people can be able to use the website and know how to incorporate accessibility features into websites.
- **Computer/human interaction** – Understanding of the fundamentals of computer/human interaction.
- **Marketing** – Have a basic understanding of marketing principles in order to create a website that will appeal to consumers/users.
- **HTML, CSS, Java script basics]** – Knowledge of the common formatting and programming languages such as HTML, CSS, and JavaScript.

Occupation-Specific Competencies

On-the-Job Training is hands-on instruction completed at work to learn the core competencies necessary to succeed in an occupation. Common types of OJT include job shadowing, mentorship, cohort-based training, assignment-based project evaluation and discussion-based training.

- **Perform unit and integration testing** – Be able to test various computing scenarios for units and integration.
- **Assist in software installation** – Understand how to assist with software installation for the organization and individual user.
- **Leverage server automation tools** – Know how to use applications which automate computing functions.
- **Conduct quality assurance testing** – Know how to run tests on software and test for compatibility and functionality issues for the website.
- **Apply design patterns** – Understand how to learn and develop design patterns for problem solving in programming.
- **De-bug and fix software issues** – Know how to locate, fix, or bypass errors (bugs) in code or devices.
- **Perform general quality assurance** – Be able to use appropriate methods to verify overall quality of website design and systems work properly.
- **Utilize integrated development environment** – Know how to use the IDE application for website development.
- **Monitor equipment functioning** – Understand how to monitor system and review information from system to detect or assess problems.
- **Implement continuous integration** – Be able to merge developer working copies with a shared mainline several times a day.
- **Collaborate for system design** – Ability to collaborate with the development team which may include systems analysts, engineers and programmers.
- **Translate technical documents into actionable work** – Understand how to create working and actionable process documents from very technical IT documents.
- **Analyze data for system capabilities** – Know how to store, retrieve and manipulate data for analysis of system capabilities and requirements.
- **Conduct customer consultation** – Know how to work with internal and external customers to gather information regarding system design, performance, and maintenance.
- **Develop and maintain software systems production** – Demonstrate ability to design, develop and modify software systems to run the website.

- **Apply defensive programming** – Ability to design model intended to ensure the continuing function of a website under unforeseen circumstances.
- **Integrate cross-functional teams** – Understand how the web development role intersects when working with cross-functional teams in the organization.

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