# Software Engineer Pathway KSB Map

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| Specialist Skills and Specialist Knowledge to be assessed | Achieved/Comments: |
| How to operate at all stages of the software development lifecycle. | As evidenced by the following report sections, I possess the proficiency to operate at all stages of the software development lifecycle:   * Section 1.3: Gap Analysis: By conducting thorough gap analysis, I identify existing deficiencies and determine the scope of software development projects. * Section 1.4: Feasibility Analysis: I assess the feasibility of software projects by considering factors such as technical, economic, and operational viability. * Section 1.5: Risk Analysis: I perform risk analysis to identify potential risks and develop mitigation strategies throughout the software development process. * Chapter 3: Technical Literature Review: I conduct a comprehensive review of relevant technical literature to stay updated with industry advancements and best practices. * Section 3.3: Requirement Analysis: I analyse and document functional and non-functional requirements, ensuring a clear understanding of the software's desired functionalities and capabilities. * Section 3.4: Software Development Methodologies: I apply appropriate software development methodologies, such as Agile or Waterfall, to guide the development process effectively. * Section 3.5: Functional and Non-Functional Requirements: I consider both functional and non-functional requirements when designing and developing software solutions. * Section 3.9: Project Management: I employ project management techniques to plan, organize, and control software development projects, ensuring timely delivery and resource management. * Chapter 5: Implementation: I effectively implement and develop software solutions based on the identified requirements and design specifications. * Chapter 6: Results: I evaluate and analyse the outcomes of software development efforts, ensuring the successful completion and achievement of project objectives.   By integrating these skills and knowledge across the software development lifecycle, as highlighted in the mentioned report sections, I effectively navigate and contribute to each stage of the process, resulting in the successful delivery of high-quality software solutions. |
| How teams work effectively to develop software solutions embracing agile and other development approaches. | As described in Section 5.6 of the report, I have experience in working effectively within teams to develop software solutions while embracing agile and other development approaches. This is exemplified by the successful execution of sprint iterations, specifically highlighted in Sections 5.6.1 (Sprint 1), 5.6.2 (Sprint 2), and 5.6.3 (Sprint 3). By adopting agile methodologies, such as Scrum, we achieved iterative and incremental development, fostering collaboration, adaptability, and continuous improvement. Throughout these sprints, our team effectively prioritized tasks, conducted regular stand-up meetings, and embraced feedback to deliver valuable software increments. By embracing agile principles and approaches, as demonstrated in the mentioned sprint sections, our team worked efficiently and collaboratively to develop software solutions while ensuring client satisfaction and meeting project objectives. |
| How to apply software analysis and design approaches. | To effectively apply software analysis and design approaches, I refer to Section 3.3 of the report, which emphasizes requirement analysis. Through this process, I thoroughly analyse and document software requirements to ensure a clear understanding of the desired outcomes. Additionally, Section 3.7 highlights the use case analysis, which helps identify user interactions and system behaviours. By combining requirement analysis and use case analysis, I apply comprehensive software analysis and design approaches that result in effective solutions aligned with the identified requirements and user needs, as outlined in the report's referenced sections. |
| How to interpret and implement a design, compliant with functional, non-functional and security requirements. | Chapter 4 of the report, specifically Section 4.2 (High-level architecture design), 4.3 (Graph database design), and 4.4 (UI design), showcases my ability to interpret and implement a design that complies with functional, non-functional, and security requirements. By thoroughly understanding the specified requirements, I develop a high-level architecture design that ensures the desired functionality and performance. Additionally, I design and implement a graph database structure to optimize data management and provide efficient querying capabilities. Furthermore, through the UI design process, I create user interfaces that are intuitive, visually appealing, and considerate of security measures. By referencing the insights presented in Chapter 4, I effectively interpret and implement designs that meet functional, non-functional, and security requirements. |
| How to perform functional and unit testing. | In accordance with Section 5.5.2 of the report, I possess the expertise to produce high-quality code by adhering to best practices and standards while writing tests. Specifically, I utilize NUnit, a widely adopted testing framework in C#, as mentioned in Section 5.5.2. By employing NUnit, I create comprehensive and effective unit and integration tests that validate the functionality and behavior of the code. These tests, as discussed in Section 5.9, serve as essential quality assurance measures, ensuring the robustness and reliability of the software. By implementing unit and integration tests throughout the development process, I adhere to best practices and standards, thereby producing high-quality code that is thoroughly tested and meets the desired objectives outlined in the respective report sections. |
| How to use and apply the range of software tools used in Software engineering. | In accordance with Section 5.4.1 of the report, I possess the knowledge and proficiency in utilizing the Github workflow as a software engineering tool. By leveraging Github workflow, I can effectively manage the software development process, automate build, and release pipelines, and facilitate collaboration among team members. Additionally, as mentioned in Section 3.15, I am well-versed in utilizing Azure DevOps, another powerful software engineering tool. Azure DevOps enables efficient task management, version control, and continuous integration and delivery (CI/CD) processes. By harnessing the capabilities of these tools outlined in Sections 5.4.1 and 3.15, I demonstrate my ability to effectively use and apply a range of software tools in software engineering practices, thereby enhancing productivity, collaboration, and the overall software development lifecycle. |
| Create effective and secure software solutions using contemporary software development languages to deliver the full range of functional and non-functional requirements using relevant development methodologies. |  |
| Undertake analysis and design to create artefacts, such as use cases to produce robust software designs. | In accordance with Section 3.7 of the report, I demonstrate the ability to undertake analysis and design processes to create robust software designs. Specifically, I engage in use case analysis to develop comprehensive and structured artefacts. By thoroughly understanding the requirements and functionality of the software, I generate use cases that effectively capture user interactions and system behaviours. These use cases serve as valuable tools in the design phase, enabling the creation of software designs that are robust and aligned with user needs. Through the application of use case analysis, I ensure the development of high-quality software solutions that meet the desired objectives outlined in Section 3.7. |
| Produce high quality code with sound syntax in at least one language following best practices and standards. | As stated in Section 5.2 of the report, I possess the proficiency to produce high-quality code by adhering to best practices and standards. This includes following sound syntax guidelines in at least one programming language. By understanding and implementing coding standards mentioned in Section 5.2, I ensure that the code I write is clean, readable, and maintainable. Additionally, in accordance with Section 5.3, I utilize a layered architecture for .NET projects, which further enhances the quality of the codebase. This structured approach facilitates modular development, separation of concerns, and scalability, resulting in a well-organised and maintainable codebase. By incorporating these practices and standards outlined in Sections 5.2 and 5.3, I consistently deliver high-quality code that aligns with industry best practices. |
| Test code to ensure that the functional and non-functional requirements have been met. | In accordance with Section 5.5 of the report, I am skilled in test-driven development (TDD), where functional requirements are translated into tests. By following TDD practices, I ensure that code is written to fulfil the specified functional requirements. As mentioned in Section 5.9, I also implement unit and integration tests to verify the correctness and performance of the codebase. These tests evaluate both functional and non-functional requirements, ensuring that the software meets the desired specifications. Using TDD and the implementation of comprehensive unit and integration tests as outlined in Sections 5.5 and 5.9, I effectively test the code to ensure that both functional and non-functional requirements are met, thus enhancing the overall quality and reliability of the software. |
| Deliver software solutions using industry standard build processes, and tools for configuration management, version control and software build, release and deployment into enterprise environments. | In accordance with Section 5.4 of Chapter 5 in the report, I successfully achieved the delivery of software solutions using industry-standard build processes and tools. Specifically, I implemented the deployment and release pipelines discussed in Section 5.4, which involved leveraging Github Workflows for efficient software deployment. Furthermore, as mentioned in Section 4 of the report, I utilized Azure Kubernetes for seamless deployment and hosting of applications. Additionally, Section 3.15 highlights the effective utilization of Azure DevOps for task management and milestone tracking. By incorporating these tools and strategies outlined in the respective report sections, I ensured the delivery of software solutions in enterprise environments was carried out smoothly and efficiently. |
| Create effective and secure software solutions using contemporary software development languages to deliver the full range of functional and non-functional requirements using relevant development methodologies. |  |
| Undertake analysis and design to create artefacts, such as use cases to produce robust software designs. | Section 3.7 of the report highlights my proficiency in undertaking analysis and design processes to create robust software designs. By employing use case analysis, I thoroughly examine user interactions and system behaviours. This enables the production of artifacts, such as use cases, which serve as the foundation for designing software solutions aligned with user needs. The application of use case analysis ensures the development of robust software designs that meet objectives and deliver high-quality solutions, as detailed in Section 3.7 |
| Produce high quality code with sound syntax in at least one language following best practices and standards. | I excel at writing high-quality code by following best practises and standards, with a particular focus on coding standards, as stated in Section 5.2 of the report. I make sure that the codebase demonstrates robustness, maintainability, and scalability by incorporating concepts like SOLID and design patterns. The development of well-structured, modular code is guided by SOLID principles, which encourage flexibility and extensibility. Additionally, I improve code reuse, readability, and overall quality by implementing design patterns like creational, structural, and behavioural patterns. I consistently write high-quality code with sound syntax, adhering to best practises and industry standards, producing effective and maintainable software solutions. I do this by making use of the guidelines provided in Section 5.2, including the SOLID principles and design patterns. |
| Perform code reviews, debugging and refactoring to improve code quality and efficiency. |  |

# Core Skills KSB Map

Use this section to demonstrate where you have achieved the core KSBs through your project. Where they have not met your project, add a comment as to why, and where you have met them.

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| Core Skills, Core Knowledge and Core Behaviours to be assessed | Achieved/Comments: |
| How business exploits technology solutions for competitive advantage. | As detailed in Section 2.12 of the report, I possess the ability to analyse legal, social, ethical, and professional issues to understand how businesses can exploit technology solutions for competitive advantage. By considering the legal and regulatory landscape, I ensure that technology solutions align with applicable laws and regulations, avoiding potential legal risks and liabilities. Moreover, I assess social and ethical considerations to ensure that technology solutions promote inclusivity, privacy, and ethical practices, enhancing the reputation and credibility of the business. Additionally, I consider professional standards and industry best practices to leverage technology solutions effectively, ultimately enabling businesses to gain a competitive edge in the market. By addressing these critical aspects outlined in Section 2.12, I facilitate the exploitation of technology solutions for competitive advantage while maintaining legal compliance, ethical integrity, and social responsibility. |
| The value of technology investments and how to formulate a business case for a new technology solution, including estimation of both costs and benefits. |  |
| Contemporary techniques for design, developing, testing, correcting, deploying and documenting software systems from specifications, using agreed standards and tools. |  |
| How teams work effectively to produce technology solutions. | Section 5.6 of the report highlights my proficiency in collaborating with teams to effectively produce technology solutions. By implementing development iterations, such as three sprints, I ensure a structured and incremental approach. This fosters communication, task prioritisation, and collaboration, resulting in the timely delivery of valuable software increments. Through my contribution, as described in Section 5.6, teams are empowered to work efficiently and achieve successful outcomes in technology solution development. |
| The role of data management systems in managing organisational data and information. |  |
| Common vulnerabilities in computer networks including unsecure coding and unprotected networks. |  |
| The various roles, functions and activities related to technology solutions within an organisation. |  |
| How strategic decisions are made concerning acquiring technology solutions resources and capabilities including the ability to evaluate the different sourcing options. |  |
| How to deliver a technology solutions project accurately consistent with business needs. |  |
| The issues of quality, cost and time for projects, including contractual obligations and resource constraints. |  |
| Analyses business and technical requirements to select and specify appropriate technology solutions. Designs, implements, tests, and debugs software to meet requirements using contemporary methods including agile development. Manages the development and assurance of software artefacts applying secure development practises to ensure system resilience. Configures and deploys solutions to end users. |  |
| Follows a systematic methodology for initiating, planning, executing, controlling, and closing technology solutions projects. Applies industry standard processes, methods, techniques and tools to execute projects. Is able to manage a project (typically less than six months, no inter-dependency with other projects and no strategic impact) including identifying and resolving deviations and the management of problems and escalation processes. |  |
| Is able to critically analyse a business domain in order to identify the role of information systems, highlight issues and identify opportunities for improvement through evaluating information systems in relation to their intended purpose and effectiveness. |  |
| Identifies organisational information requirements and can model data solutions using conceptual data modelling techniques. Is able to implement a database solution using an industry standard database management system (DBMS). Can perform database administration tasks and is cognisant of the key concepts of data quality and data security. Is able to manage data effectively and undertake data analysis. |  |
| Can apply organisational theory, change management, marketing, strategic practice, human resource management and IT service management to technology solutions development. Develops well-reasoned investment proposals and provides business insights. |  |
| Can undertake a security risk assessment for a simple IT system and propose resolution advice. Can identify, analyse and evaluate security threats and hazards to planned and installed information systems or services (e.g. Cloud services). |  |
| Can plan, design and manage computer networks with an overall focus on the services and capabilities that network infrastructure solutions enable in an organisational context. Identifies network security risks and their resolution. |  |
| Fluent in written communications and able to articulate complex issues. |  |
| Makes concise, engaging and well-structured verbal presentations, arguments and explanations. |  |
| Able to deal with different, competing interests within and outside the organisation with excellent negotiation skills. |  |
| Is able to identify the preferences, motivations, strengths and limitations of other people and apply these insights to work more effectively with and to motivate others. |  |
| Competent in active listening and in leading, influencing and persuading others. |  |
| Able to give and receive feedback constructively and incorporate it into his/her own development and life-long learning. |  |
| Applies analytical and critical thinking skills to Technology Solutions development and to systematically analyse and apply structured problem solving techniques to complex systems and situations. |  |
| Able to put forward, demonstrate value and gain commitment to a moderately complex technology-oriented solution, demonstrating understanding of business need, using open questions and summarising skills and basic negotiating skills. |  |
| Able to conduct effective research, using literature and other media, into IT and business related topics. |  |
| Have demonstrated that they have mastered basic business disciplines, ethics and courtesies, demonstrating timeliness and focus when faced with distractions and the ability to complete tasks to a deadline with high quality. |  |
| Flexible attitude. |  |
| Ability to perform under pressure. |  |
| A thorough approach to work. |  |
| Logical thinking and creative approach to problem solving. |  |