

D3 Developer is an Andelan role that comes after working as a D2 Developer, and before roles like D4, Software Architect, or Product Manager. A D3 developer has come to the point where the programming language they are working in does not matter-- they can easily contribute and lead their team by example, regardless of stack or project requirements.

D3's are expert problem solvers-- able to solve bugs on a programming language level, as well as to work with a team to outline solutions to high level problems and goals. They have a diverse set of experiences and are constantly learning more skills and languages so that they are able to draw on a broad toolkit to solve problems with their team.

It includes the following Outputs:

- 01- Advanced Data Structures
- 02- Algorithms
- 03- Systems
- 04- Architecture
- 05- Build Automation and Version Control
- 06- Code Organization- Structure and Design
- 07- Testing - Defensive Coding
- 08- Advanced APIs
- 09- Advanced Databases
- 10- Agile Process
- 11- Relationship Building
- 12- Stakeholder Management
- 13- Expectations Management
- 14- Team Dynamics
- 15- Attention to Detail
- 16- Adaptability
- 17- Decision Making
- 18- Problem Solving
- 19- Writing Professionally
- 20- Holistic & Big Picture Thinking
- 21- Leadership
- 22- Mentorship
- 23- Maintaining and Sharing Knowledge

[Leave your Feedback Here. \(https://goo.gl/forms/3L1LYly2jMhZrYn2\)](https://goo.gl/forms/3L1LYly2jMhZrYn2)

Output 1- Advanced Data Structures

Skill Description:

A person with this skill makes use of advanced data structures in their programming. They should not necessarily be building data structures from scratch, but should be able to implement them with ease. They are able to immediately explain which data structure makes the most sense for their programming goal, and can describe real-life problems whose solutions have implemented common data structures.

Note: *Many of these are a review of D2, but you should take time to refresh your memory to deepen your ability to use these with fluency.*

Output:

- **Task:** Make a list of *at minimum* five data structures you might use in your work, and map them to examples of when they would be used.
- **Resources:** You can represent them however you wish-- through diagrams, written words, etc.
- **Include:** Reflect with a colleague or teammate to see if they came up with any ideas you missed

Knowledge

Knowledge Unit	Studied Applied	
How to determine the best data structure for an end goal	<input type="checkbox"/>	<input type="checkbox"/>
Benefits and drawbacks of the most common data structures	<input type="checkbox"/>	<input type="checkbox"/>
How each data structure actually works in computer memory	<input type="checkbox"/>	<input type="checkbox"/>
How to communicate in “Big-O” notation (<i>refresher</i>)	<input type="checkbox"/>	<input type="checkbox"/>
How and when to use Binomial & Fibonacci heaps	<input type="checkbox"/>	<input type="checkbox"/>
How and when to use AVL/Red black trees	<input type="checkbox"/>	<input type="checkbox"/>
How and when to use Splay Trees	<input type="checkbox"/>	<input type="checkbox"/>
How and when to use Skip Lists	<input type="checkbox"/>	<input type="checkbox"/>
How and when to use tries	<input type="checkbox"/>	<input type="checkbox"/>

Behavior

Observable Behavior	Practiced Observed	
Context: When I am deciding what data structure to use, Action: I first consider whether it will “fit” my problem.	<input type="checkbox"/>	<input type="checkbox"/>
Context: Once I decide on possible structures that fit my problem, Action: I consider implementation challenges such as performance, maturity, and supportability.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I still have multiple data structures that could work for my goal, Action: I consider speed and efficiency.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I have a system that reads and writes large blocks of data, Action: I consider using a B-tree implementation.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I need dynamic memory, Action: I use heaps.	<input type="checkbox"/>	<input type="checkbox"/>

Belief

Embodied Belief	Felt Demonstrated
-----------------	-------------------

Knowing which data structure to use does not mean I must write them from scratch-- implementation saves me that trouble. ☐ ☐

Output 2 – Algorithms

Skill Description

A person with this skill can implement high-performance data entry and data retrieval over complex structured data sets. They can recognize and code programming solutions using the appropriate algorithms.

Output

- **Task:** Make a list of *at minimum* five algorithm types you might use in your work, and map them to examples of when they would be used.
- **Resources:** You can represent them however you wish-- through diagrams, written words, etc.
- **Include:** Reflect with a colleague or teammate to see if they came up with any ideas you missed

Knowledge

Knowledge Unit	Studied Applied	
How and when to use search algorithms	<input type="checkbox"/>	<input type="checkbox"/>
How and when to use greedy algorithms	<input type="checkbox"/>	<input type="checkbox"/>
How and when to use divide-and-conquer programming	<input type="checkbox"/>	<input type="checkbox"/>
How and when to use dynamic programming/dynamic optimization	<input type="checkbox"/>	<input type="checkbox"/>
How and when to use reactive programming	<input type="checkbox"/>	<input type="checkbox"/>
How and when to use graph algorithms	<input type="checkbox"/>	<input type="checkbox"/>
How to identify and work with NP problems	<input type="checkbox"/>	<input type="checkbox"/>
How to determine the appropriate algorithm for a goal	<input type="checkbox"/>	<input type="checkbox"/>
How to work with various sorting data sets, such as:		
– Heap Sort	<input type="checkbox"/>	<input type="checkbox"/>
– Quick Sort	<input type="checkbox"/>	<input type="checkbox"/>
– Merge Sort	<input type="checkbox"/>	<input type="checkbox"/>
– Insertion sort	<input type="checkbox"/>	<input type="checkbox"/>
Definition of hash algorithms and the problems they aim to solve	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced Observed	
Context: When I am deciding which algorithm is best for my dataset, Action: I start by looking at the process that generated the data.	<input type="checkbox"/>	<input type="checkbox"/>
Context: After looking at the processes that generated my data, Action: I consider how many training points and how many features my dataset has.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am deciding between several algorithms that could work,		

Action: I consider whether my model is robust enough to deal with the number of outliers my data has, and whether my model matches the assumptions of the problem at hand.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I need to quickly come up with an index for some data, Action: I use a hash algorithm.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When selecting a hash algorithm, Action: I choose one with a minute propensity for collision.	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt Demonstrated	
By having a large toolkit of algorithms, I have the flexibility to model and solve real-world problems.	<input type="checkbox"/>	<input type="checkbox"/>

Output 3– Systems

Skill Description

A person with this skill can explain how the front end, back end, and hardware interact to create a functional application, and uses that knowledge to create effective code architecture. They are able to work with systems to ensure the security of their application or program.

Output

- **Task:** On a new or existing application, add in memory caching and authentication functionality for security.
 - **Resources:** You can choose whatever method you feel is most appropriate for each.
 - **Include:** N/A
-

Knowledge

Knowledge Unit	Studied Applied	
The components of various programming stacks	<input type="checkbox"/>	<input type="checkbox"/>
Definition of persistence and when to use it	<input type="checkbox"/>	<input type="checkbox"/>
How to work with hardware such as:		
– CPU		
– Memory	<input type="checkbox"/>	<input type="checkbox"/>
– Cache	<input type="checkbox"/>	<input type="checkbox"/>
– Interrupts	<input type="checkbox"/>	<input type="checkbox"/>
– Microcode	<input type="checkbox"/>	<input type="checkbox"/>
Difference between static and dynamic linking and when to use each	<input type="checkbox"/>	<input type="checkbox"/>
Definition of an assembly language and when to use it (<i>not necessarily how to use it</i>)	<input type="checkbox"/>	<input type="checkbox"/>
What a compiler is and how it works (<i>at a high level</i>)	<input type="checkbox"/>	<input type="checkbox"/>
Tradeoffs between compiled and interpreted languages	<input type="checkbox"/>	<input type="checkbox"/>
Benefits and drawbacks of JIT (or dynamic) compilation	<input type="checkbox"/>	<input type="checkbox"/>

Languages that use JIT compilation	<input type="checkbox"/>	<input type="checkbox"/>
The importance of garbage collection	<input type="checkbox"/>	<input type="checkbox"/>
How and when to implement garbage collection with various stacks	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced	Observed
Context: When I have more than one process that share the same library, Action: I use dynamic linking.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I want to reduce the total consumption of memory (disk space, RAM, cache), Action: I use dynamic linking.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I have data that will persist in my application, Action: I implement appropriate storage and memory usage based on the language and the amount of data being stored.	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt	Demonstrated
Understanding how systems are built from the ground up gives me a holistic edge when thinking about ways I could design a performant system or improve the performance of existing systems.	<input type="checkbox"/>	<input type="checkbox"/>

Output 4– Architecture

Skill Description

A person with this skill is aware of the various system architectures available to them when developing a new application, and are capable of contributing to a system already architected following any pattern.

Output

- **Task:** Using a code base that has been written either by your own team or by an open source community, outline how you could refactor the code base using different architectural patterns that were not used in the original code base.
- **Resources:** Reflect on why you would make the change and what benefits and drawbacks it would entail.
- **Include:** N/A

Alternative Output

- **Task:** Determine a real-world problem that you would like to solve through a new software or application.
- **Resources:** Sketch out how you would build it using the most appropriate architecture based on the goals and size of your future application.
- **Include:** Collaborate with a colleague or teammate to get their feedback on the architectural pattern you chose.

Knowledge

Knowledge Unit	Studied	Applied
How to recognize and use design patterns	<input type="checkbox"/>	<input type="checkbox"/>
Benefits and drawbacks of common architectural patterns such as:		
– Domain Logic	<input type="checkbox"/>	<input type="checkbox"/>
– Data Source architectural patterns	<input type="checkbox"/>	<input type="checkbox"/>
– Object-Relational data patterns	<input type="checkbox"/>	<input type="checkbox"/>
– Object-Relational structural patterns	<input type="checkbox"/>	<input type="checkbox"/>
– Object-Relational metadata mapping patterns	<input type="checkbox"/>	<input type="checkbox"/>
– Multi-tier architecture	<input type="checkbox"/>	<input type="checkbox"/>
– SOA	<input type="checkbox"/>	<input type="checkbox"/>
– Microservices	<input type="checkbox"/>	<input type="checkbox"/>
– Serverless architecture	<input type="checkbox"/>	<input type="checkbox"/>
How to determine the best architectural pattern for a goal	<input type="checkbox"/>	<input type="checkbox"/>
How to effectively communicate architecture to the team	<input type="checkbox"/>	<input type="checkbox"/>
Difference between 2 & tier 3 architecture and when to use each	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced	Observed
Context: When I am deciding on the most appropriate architectural pattern for my program, Action: I consider the goals and size of my program.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am building a very large code base, Action: I use multi-tiered architecture.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I use multi-tiered architecture in my program, Action: I take extra care to ensure that it is properly organized and manageable.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am building a microservice or API, Action: I consider whether a monolith architecture could be the most effective.	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt	Demonstrated
A Senior Developer can see the big picture of how everything interacts.	<input type="checkbox"/>	<input type="checkbox"/>

Output 5– Build Automation and Version Control

Skill Description

A person with this skill can implement effective automation in testing and build environments. They make impeccable use of version control to maximize efficiency.

Output

- **Task:** On a new or existing project, set up build automation tools and testing.
 - **Resources:** Use whatever tools are the most effective for your program based on language and requirements. Ensure that you include thorough documentation as you set up your automated testing scripts.
 - **Include:** N/A
-

Knowledge

Knowledge Unit	Studied Applied	
How to use distributed VCS systems	<input type="checkbox"/>	<input type="checkbox"/>
How to use the following version control tools (and benefits/drawbacks of each):		
– Git	<input type="checkbox"/>	<input type="checkbox"/>
– Bzr	<input type="checkbox"/>	<input type="checkbox"/>
– Mercurial	<input type="checkbox"/>	<input type="checkbox"/>
– Darcs	<input type="checkbox"/>	<input type="checkbox"/>
How and when to use the advanced functionalities of Git:		
– Merging vs. Rebasing	<input type="checkbox"/>	<input type="checkbox"/>
– Resetting, Checking Out, and Reverting	<input type="checkbox"/>	<input type="checkbox"/>
– Git Hooks	<input type="checkbox"/>	<input type="checkbox"/>
– Git Templates	<input type="checkbox"/>	<input type="checkbox"/>
– Refs and the Reflog	<input type="checkbox"/>	<input type="checkbox"/>
How to clone and merge a branch from a remote Repo	<input type="checkbox"/>	<input type="checkbox"/>
How and when to use each Git workflow, and how they differ from each other	<input type="checkbox"/>	<input type="checkbox"/>
How to set up a script for a build automation system	<input type="checkbox"/>	<input type="checkbox"/>
Most common build automation tools	<input type="checkbox"/>	<input type="checkbox"/>
How to automate the generation of release notes	<input type="checkbox"/>	<input type="checkbox"/>
How to set up automated functional load tests	<input type="checkbox"/>	<input type="checkbox"/>
How to set up automated performance and UI tests	<input type="checkbox"/>	<input type="checkbox"/>
Basic principles of Continuous Integration	<input type="checkbox"/>	<input type="checkbox"/>
Most common Continuous Integration tools	<input type="checkbox"/>	<input type="checkbox"/>
Basic principles of Continuous Deployment	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced Observed	
Context: When I am planning on using continuous integration, Action: I always implement build automation first.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am setting up build automation, Action: I thoroughly detail all documentation about my programs assumptions, dependencies, and requirements.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I set up a script for a build automation system, Action: I always tag the code in source control.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I want to execute the build process whenever a code change is checked in, Action: I implement Continuous integration.	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief

Working with a team means that I will always be iterating-- Version control is critical to my team's success.

Felt Demonstrated

☐ ☐

Build automation helps me prevent common bugs and speed up the development process.

☐ ☐

Output 6– Code Organization, Structure, & Design

Skill Description

A person with this skill has an impeccable code design mindset that they use to help improve both UI/UX design, as well as high-level design patterns and code structure. They can visualize and design programs with multiple product lines, external integrations, and interacting systems.

Output

- **Task:** Using a code base from someone on your team, in a published application, or in the open source community, highlight the main code design & structure principles that you notice it making use of.
- **Resources:** You can choose to illustrate or explain through whatever medium you find most effective.
- **Include:** Share with your team and get feedback on other design aspects you missed.

Alternative Output:

- **Task:** Using a visual design from someone on your team or in the open source community, scan the design and build it as closely as possible in source code.
- **Resources:** Use the most effective programming language and code structure to create the product.
- **Include:** Share this build with the designer if possible.

Knowledge

Knowledge Unit

Essential aspects of “readable” code

☐ ☐

Best practices for code organization within a file

☐ ☐

Best practices for code organization across file structures

☐ ☐

How code design and structure can lead to performance improvements or bottlenecks

☐ ☐

How to visualize and design integrations with external systems

☐ ☐

How to use design operations support systems (monitoring, reporting, fail overs)

☐ ☐

Best practices in UI/UX design

☐ ☐

Best practices in Human Centered Design ("https://www.ideo.com/post/design-kit")	<input type="checkbox"/>	<input type="checkbox"/>
Major software design patterns and the benefits of each	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced	Observed
Context: When writing code, Action: I avoid deep nesting of conditionals or methods.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am working as a member of a team, Action: I keep code structure in mind and suggest improvements where I see opportunities to make code more efficient.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am working as a member of a team, Action: I keep user experience in the front of my mind and suggest design improvements where I see opportunities to better interact with the user.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When a designer sends me a picture of something to create, Action: I first scan it and outline how to convert it into source code.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I have determined what I can and cannot create in source code based on a designer's wireframe, Action: I always explain to the designer any deviations I need to make from the design and why.	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt	Demonstrated
When I am programming, I am communicating to other developers who will use my code, and must do so in the clearest possible way.	<input type="checkbox"/>	<input type="checkbox"/>
A great developer can anticipate performance bottlenecks but knows not to pre-optimize		
My files should look beautiful.	<input type="checkbox"/>	<input type="checkbox"/>
Code organization is not just "pretty:" it is critical to highly functional and usable code.	<input type="checkbox"/>	<input type="checkbox"/>

Output 7– Testing & Defensive Coding

Skill Description

A person with this skill always plans their code around testing, exception checking, and anticipating failure. They are meticulous about having bug-free code, and may even have their own library to help with defensive coding.

Note: *All Andelan developers should have testing skills-- this is repeated as a review and reminder that D3 testing skills should be impeccable. *

Output

- **Task:** Using a new or existing program, debug thoroughly, and see what you are able to catch. Then, outline how you would re-build the program using TDD.
- **Resources:** Use any type of testing you deem most appropriate.
- **Include:** Compare and contrast the testing results of the two approaches and reflect with your team.

Knowledge

Knowledge Unit	Studied	Applied
How to communicate potential bug and security risks to a team	<input type="checkbox"/>	<input type="checkbox"/>
How to manage risk in a code base	<input type="checkbox"/>	<input type="checkbox"/>
How to maintain a consistent exception handling strategy in all layers of code	<input type="checkbox"/>	<input type="checkbox"/>
Benefits of TDD and how to implement it (https://github.com/andela/learningmap/blob/master/Phase-C/Pre-Fellowship/10%20-%20TDD%20and%20Debugging/README.md)	<input type="checkbox"/>	<input type="checkbox"/>
How to visualize changes required for bug fixes	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced	Observed
Context: When I see a potential risk in my team's code base, Action: I communicate it to my team.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am coding, Action: I always write my code to detect possible exceptions before they happen.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am implementing an exception handling strategy, Action: I come up with guidelines on exception handling for the entire system, not just my code base.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am programming, Action: I use TDD to check my code along the way.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am working on a team, Action: I actively encourage the use of TDD as a standard amongst the team.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am debugging some code, Action: I work with my team to facilitate a root cause analysis across integrated components of my team's program.	<input type="checkbox"/>	<input type="checkbox"/>
Context: Before diving into testing a bug, Action: I first visualize what will be required for the fix.	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt	Demonstrated
Debugging is a team sport.	<input type="checkbox"/>	<input type="checkbox"/>
I am ruthless about hunting down and resolving every bug in my team's code.	<input type="checkbox"/>	<input type="checkbox"/>

Output 8– Advanced APIs

Skill Description

A person with this skill can design, build, and work with complex APIs. When needed, they write libraries to simplify frequently used tasks or to fill in the gaps of an existing API.

Output

- **Task:** Design and build a basic API for a real-world problem or program you are working on.
 - **Resources:** Use REST protocol in your build and design
 - **Include:** N/A
-

Knowledge

Knowledge Unit	Studied	Applied
Different applications and use cases for APIs	<input type="checkbox"/>	<input type="checkbox"/>
How to build non-web APIs	<input type="checkbox"/>	<input type="checkbox"/>
How to version an API	<input type="checkbox"/>	<input type="checkbox"/>
How to design and build an API using protobuf protocol	<input type="checkbox"/>	<input type="checkbox"/>
How to design and build an API using REST protocol	<input type="checkbox"/>	<input type="checkbox"/>
How to design and build an API using XML-RPC protocol	<input type="checkbox"/>	<input type="checkbox"/>
Differences between REST protocol and XML-RPC protocol, and when to use each	<input type="checkbox"/>	<input type="checkbox"/>
Definition of backwards compatibility	<input type="checkbox"/>	<input type="checkbox"/>
How to implement new features in an API	<input type="checkbox"/>	<input type="checkbox"/>
How and when to create a library that sits on top of an API	<input type="checkbox"/>	<input type="checkbox"/>
Difference between centralized APIs and distributed APIs	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced	Observed
Context: When I notice that I am repeating a few API tasks over and over, Action: I create a library that helps simplify them.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When there is a gap in how I want to use my API, Action: I create a library to fill that gap.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I need to achieve backward-compatibility with an API, Action: I consider whether I can do so by simply adding new parameters or methods.	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt	Demonstrated
APIs age just like we do... and we must be prepared to evolve them as new bugs and dependencies arise.	<input type="checkbox"/>	<input type="checkbox"/>

Output 9– Advanced Databases

Skill Description

A person with this skill is fluent in administration, optimization, and querying for at least one SQL and one NoSQL database. They can explain how databases work on a high level, including how data and indexes are stored.

Output

- **Task:** Create an application that uses SQL or NoSQL to query a database. Make sure that you optimize your database for performance.
- **Resources:** Use whatever SQL/NoSQL language and database is most appropriate for your goals.
- **Include:** An explanation of the database and language you chose.

Bonus Output: If you did the Output above using NoSQL, repeat with SQL (or vice versa).

Knowledge

Knowledge Unit	Studied Applied	
Elements of basic database administration	<input type="checkbox"/>	<input type="checkbox"/>
How to optimize database performance	<input type="checkbox"/>	<input type="checkbox"/>
How to optimize database indexes	<input type="checkbox"/>	<input type="checkbox"/>
How to write advanced select queries for at least one SQL language	<input type="checkbox"/>	<input type="checkbox"/>
Distinction between cursor usage and relational SQL, and when to use each	<input type="checkbox"/>	<input type="checkbox"/>
How to write advanced select queries for at least one NoSQL language	<input type="checkbox"/>	<input type="checkbox"/>
When to use SQL vs. NoSQL, and the benefits and drawbacks of each	<input type="checkbox"/>	<input type="checkbox"/>
How to mirror and replicate a database	<input type="checkbox"/>	<input type="checkbox"/>
When and how to use the two-phase commit protocol	<input type="checkbox"/>	<input type="checkbox"/>
Advantages and disadvantages of two-phase commit	<input type="checkbox"/>	<input type="checkbox"/>
How data is stored internally	<input type="checkbox"/>	<input type="checkbox"/>
How indexes are stored internally	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced Observed	
Context: When I am mirroring a database, Action: I ensure that the principal and the mirror share a Distributor.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am using multiple tasks to access my database in parallel, Action: I use partitioning to optimize my database performance.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I build a database, Action: I always leave free space in my database for growth.	<input type="checkbox"/>	<input type="checkbox"/>
Context: As my database grows, Action: I continually monitor and change any database objects that become inefficient.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When my database has become inefficient, Action: I realign and restructure the database objects.	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt Demonstrated	
No amount of system tuning can optimize a poorly designed or disorganized database.	<input type="checkbox"/>	<input type="checkbox"/>
My database will change over time and with use, and I must be prepared to refactor it accordingly.	<input type="checkbox"/>	<input type="checkbox"/>
Data is power for my application. I must be able to effectively manage it.	<input type="checkbox"/>	<input type="checkbox"/>

Outcome 10 – Agile Process

Skill Description

The Fellow knows how to run daily standups, sprint planning sessions and retrospectives. They can manage the burndown chart, and manage technical debt for the product.

Output

After attaining this skill, and as a demonstration of it, a person should be able to create the following:

1. Sprint level accounting of throughput

Objectives

Knowledge

Knowledge Unit	Studied Applied	
I can describe the following from memory:		
* Sprint Planning	<input type="checkbox"/>	<input type="checkbox"/>
* Sprint Retrospectives and when to do them	<input type="checkbox"/>	<input type="checkbox"/>
* Burndown Chart	<input type="checkbox"/>	<input type="checkbox"/>
* Technical Debt	<input type="checkbox"/>	<input type="checkbox"/>
* The benefits of Agile over other Software Development Methodologies	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced Observed	
Context: When I'm working with a new team Action: I identify the Agile methods they currently have in place and adopt them	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I notice areas of improvement in a team's process (eg. they could use more retrospectives) Action: I share my observations and discuss the advantages of making the modifications at the appropriate point in their current process	<input type="checkbox"/>	<input type="checkbox"/>
Context: Whenever I notice technical debt accruing Action: I log it using the current debt logging system (eg as a chore in the project backlog). If none	<input type="checkbox"/>	<input type="checkbox"/>

exists, I start one

Context: Whenever I run daily standups Action: I urge team members to keep their updates short	<input type="checkbox"/>	<input type="checkbox"/>
--	--------------------------	--------------------------

Context: Whenever I run sprint retrospectives Action: I ask team members to discuss what worked, what did not work and what they'd like to change	<input type="checkbox"/>	<input type="checkbox"/>
---	--------------------------	--------------------------

Context: When my team is not making strong progress between sprint planning sessions Action: I use the retrospectives to figure out why and to create possible solutions	<input type="checkbox"/>	<input type="checkbox"/>
--	--------------------------	--------------------------

Context: When team members pick stories/tasks during sprint planning sessions Action: I encourage team members to pick stories that they want to work on from the prioritized backlog	<input type="checkbox"/>	<input type="checkbox"/>
---	--------------------------	--------------------------

Context: During every sprint Action: I use the burndown chart to predict how well the team is going to meet their sprint goals and manage expectations accordingly	<input type="checkbox"/>	<input type="checkbox"/>
--	--------------------------	--------------------------

Context: When I'm on a team that may be unfamiliar with Agile methodologies Action: I articulate the benefits of Agile over other software methodologies	<input type="checkbox"/>	<input type="checkbox"/>
--	--------------------------	--------------------------

Beliefs

Embodied Belief	Felt Demonstrated	
Agile processes are one of the most effective ways to manage team contributions to a software product	<input type="checkbox"/>	<input type="checkbox"/>
Everything can be iteratively improved on, even the process you're using to improve	<input type="checkbox"/>	<input type="checkbox"/>
Improvement is best done within your current working process as an "evolution"	<input type="checkbox"/>	<input type="checkbox"/>
Revolutionaries waste time and gum up the works	<input type="checkbox"/>	<input type="checkbox"/>

Outcome 11 – Relationship Building

Skill Description

This is a specific aspect of Relationship Building related to a Technical Team Lead's responsibilities to Clients. The Technical Team Lead has the ability to establish themselves as a trusted advisor to the Client, where the Client sees them as having the Client's best interest at hand and capable of giving unbiased advice on the best solution for the Client's needs.

Output

After attaining this skill, and as a demonstration of it, a person should be able to create the following:

1. A document logging trust building exchanges between Fellow and Client highlighting advice given to Client(s) and positive Client responses to Fellow advice

Objectives

Knowledge

Knowledge Unit	Studied Applied	
I can describe the following from memory:		
* What does it mean to be a trusted advisor to a client?	<input type="checkbox"/>	<input type="checkbox"/>
* What are the top 3 most critical needs of my client ?	<input type="checkbox"/>	<input type="checkbox"/>
* What are the differences between the best interests of my Client, Andela, and myself ?	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced	Observed
Context: During sprint planning, retrospective, strategy or problem solving sessions Action: I offer suggestions/ideas that carry the best interests of the clients (business and team members) at heart	<input type="checkbox"/>	<input type="checkbox"/>
Context: During decision making processes/discussions Action: I ask questions about other's ideas in order to validate them through the lens of the team objectives and the client's business goals	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt	Demonstrated
My opinions matter	<input type="checkbox"/>	<input type="checkbox"/>
I am capable of offering suggestions and ideas that are instrumental to my client company's growth and success	<input type="checkbox"/>	<input type="checkbox"/>
By demonstrating advisorship to clients, I can build a level of trust that leads to my Client hiring additional Fellows	<input type="checkbox"/>	<input type="checkbox"/>

Outcome 12 – Stakeholder Management

Skill Description

The Fellow includes junior members of their team as stakeholders and understands how to appropriately communicate the right level of information to them.

Output

After attaining this skill, and as a demonstration of it, a person should be able to create the following:

1. A log that outlines the stakeholders of your product and team and how you interface with each as a senior member of the team.
2. A log where you share contextual information with your junior team to help them work effectively.

Objectives

Knowledge

Knowledge Unit	Studied Applied	
I can describe the following from memory:		
* How to engage with my junior team members as stakeholders?	<input type="checkbox"/>	<input type="checkbox"/>
* What do my junior team members need to know to work effectively?	<input type="checkbox"/>	<input type="checkbox"/>
* What forms of communication do my junior team members respond to the most?	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced	Observed
Context: When leading my team Action: I send them regular updates on happenings in the organization.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When providing my team with updates Action: I do so with detailed information that enables them to see how their tasks fit into the goals of the organization/project	<input type="checkbox"/>	<input type="checkbox"/>
Context: When providing my team with updates Action: I manage the level of detail so that the updates do not distract them from their priorities.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When assigning tasks/responsibilities Action: I provide insight into how those tasks/responsibilities tie into the organization/project goals	<input type="checkbox"/>	<input type="checkbox"/>
Context: When communicating with my team Action: I am conscious of their communication channel preferences and leverage those to make sure that the information is received by my team members	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt	Demonstrated
Involving junior members of my organization as stakeholders, increases the amount of value that they create for the team and organization	<input type="checkbox"/>	<input type="checkbox"/>
I can leverage the unique roles and preferences of ALL stakeholders to promote success for myself, my team, and my organization(s)	<input type="checkbox"/>	<input type="checkbox"/>

Output 13– Expectations Management

A person with this skill can manage expectations of fellow team members. They effectively communicate the appropriate level of information to each person, and are adept at estimating and managing expectations.

Output

After attaining this skill, and as a demonstration of it, a person should be able to create the following:

1. Document of each team member's goals and motivations

Objectives

Knowledge

Knowledge Unit	Studied	Applied
I can describe the following from memory:		
* What are the goals and motivations of my team members?	<input type="checkbox"/>	<input type="checkbox"/>
* How I can use the understanding of my team members goals and expectations to work better and more efficiently on the team	<input type="checkbox"/>	<input type="checkbox"/>
* How to identify reasonable vs unreasonable expectations	<input type="checkbox"/>	<input type="checkbox"/>
* What do you do when there are unreasonable expectations from team members or other stakeholders?	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced	Observed
Context: When delivery of milestones may not be met timely Action: I proactively inform all stakeholders of the situation	<input type="checkbox"/>	<input type="checkbox"/>
Context: When informing stakeholders about delays in delivering milestones Action: I offer courses of action to mitigate the milestone delivery concerns	<input type="checkbox"/>	<input type="checkbox"/>
Context: When there are unreasonable expectations for/within my team Action: I reject them and offer reasonable ones with reasons	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I have done a task before, Action: I build in a small buffer of time in my estimation to mitigate risk.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I have not done a task before, Action: I consider if I have done a similar task in the past.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I have done a similar task in the past, Action: I base my estimation on that similar task and then double my estimate to account for what I will need to learn as I work.	<input type="checkbox"/>	<input type="checkbox"/>
Context: Before giving a time estimate for a task that is completely new to me, Action: I research the task, what it will take to accomplish it, and how long it takes an average person to accomplish the task.		
Context: After researching a new task thoroughly and determining how long it takes an "average" person to accomplish it, I triple the estimate to give myself space to learn how to do the task and make mistakes along the way.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am communicating updates or changes in time estimates to my team or stakeholders, Action: I err on the side of over-communication and give frequent updates on my timeline.	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt	Demonstrated
My stakeholders are not just the product owners-- Junior members of my team are also my stakeholders.	<input type="checkbox"/>	<input type="checkbox"/>
As a Senior Developer, any decision I make affects my product and my team	<input type="checkbox"/>	<input type="checkbox"/>

members.

People will celebrate those who over-communicate around estimated timelines, but will cease to trust those who hide behind excuses or fail to update their timelines.	<input type="checkbox"/>	<input type="checkbox"/>
---	--------------------------	--------------------------

It is my responsibility to let a requester know the tradeoffs that will be required to get something done.	<input type="checkbox"/>	<input type="checkbox"/>
--	--------------------------	--------------------------

Knowing the goals and motivations of my team members allows me to work better and more efficiently as a D3 Developer.	<input type="checkbox"/>	<input type="checkbox"/>
---	--------------------------	--------------------------

Output 14– Team Dynamics

A person with this skill is a critical part of their direct and broader team. They act as a trusted advisor to both their client/stakeholders and to their team, and consider themselves responsible not only for their own contributions, but also for the overall output of their team. They actively build relationships and mentor more junior teammates to increase their team's overall effectiveness.

Output

- **Task:** Using the context of your current project or a project that you have worked on in the past, create a document that outlines the roles and responsibilities of each of your team members. If possible, document their strengths, challenges, and expectations as well. Include your broader team and stakeholders for a complete picture of your team dynamics.
- **Resources:** Use whatever medium is most effective for you (diagram, writing, pivotal tracker, etc).
- **Include:** Share with your team and discuss their feedback on your suggestions.

Knowledge

Knowledge Unit	Studied Applied	
Familiarity with the role and responsibilities of every member of my team	<input type="checkbox"/>	<input type="checkbox"/>
How to identify relationship dynamics on a team	<input type="checkbox"/>	<input type="checkbox"/>
How to identify burnout among teammates	<input type="checkbox"/>	<input type="checkbox"/>
How to use version control to empower team collaboration	<input type="checkbox"/>	<input type="checkbox"/>
How to unblock team members	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced Observed	
Context: When I join a team, Action: I engage with team members to understand their historical working relationships (conflicts, resolutions, success stories).	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I notice my team growing frustrated or burned out, Action: I take immediate action to support them by going to our team lead.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I notice conflict between teammates, Action: I mediate by helping each of them understand where the other is coming from.	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt Demonstrated	
My work is not just the code I write-- it is the work of my team as a whole.	<input type="checkbox"/>	<input type="checkbox"/>
When my team succeeds, I succeed.	<input type="checkbox"/>	<input type="checkbox"/>
By constantly being aware of my team dynamics, I can help other members of my team develop excellent awareness of team dynamics.	<input type="checkbox"/>	<input type="checkbox"/>

Outcome 15 – Attention to Detail

Skill Description

The Fellow demonstrates the ability to review the outputs of multiple team members; and reinforce team members' attention to detail.

Output

After attaining this skill, and as a demonstration of it, a person should be able to create the following:

1. A number of email/slack exchanges with team members that demonstrate modelling and managing for attention to detail
2. An example of code that you paired with another developer on to refactor-- share the code before your code review and after to display the details you changed.

Objectives

Knowledge

Knowledge Unit	Studied Applied	
I can describe the following from memory:		
* How to perform code reviews	<input type="checkbox"/>	<input type="checkbox"/>
* How to review feature pull requests	<input type="checkbox"/>	<input type="checkbox"/>
* What makes code readable	<input type="checkbox"/>	<input type="checkbox"/>
* What makes code maintainable	<input type="checkbox"/>	<input type="checkbox"/>
* What makes code testable	<input type="checkbox"/>	<input type="checkbox"/>
* What makes code extensible	<input type="checkbox"/>	<input type="checkbox"/>
* What are common reasons why junior developers leave out some details in their work?	<input type="checkbox"/>	<input type="checkbox"/>
* Ways that communication could be ambiguous	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced Observed	
Context: Before I accept feature pull requests Action: I review the product state and confirm that the submitted work behaves as it's supposed to as	<input type="checkbox"/>	<input type="checkbox"/>

specified by the feature description

Context: Before I accept feature pull requests Action: I review the code and confirm that the submitted work adheres to the company/industry code standards	<input type="checkbox"/>	<input type="checkbox"/>
Context: When doing code reviews Action: I look out for violation of style guides and best practices	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I find violations of style guides and best practices during code reviews Action: I point them out in a kind form of constructive criticism	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I point out flaws in attention to detail Action: I explain why it is important to pay attention to those details	<input type="checkbox"/>	<input type="checkbox"/>
Context: At the start of every sprint Action: I remind my team members to take time to review and compare task/feature specifications to their work before making pull requests	<input type="checkbox"/>	<input type="checkbox"/>
Context: Before reading a document/correspondence from a team member Action: I prime myself with what details to expect	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I observe ambiguity in team member communications Action: I offer feedback on missing details and how the message could be misunderstood	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt Demonstrated	
My behaviors will set the bar for attention to detail that my teammates will hold themselves to	<input type="checkbox"/>	<input type="checkbox"/>
Looking out for the details in the work of others helps me to become more detail-oriented	<input type="checkbox"/>	<input type="checkbox"/>
By offering reasons why attention to detail is important, I reinforce my team members detail-orientedness	<input type="checkbox"/>	<input type="checkbox"/>
I can help my team members cultivate habits that will enable them output more detail-oriented work	<input type="checkbox"/>	<input type="checkbox"/>
Attention to detail can be observed in all aspects of technology development: code quality, product/feature quality, and all forms of communication	<input type="checkbox"/>	<input type="checkbox"/>

Outcome 16 – Adaptability

Skill Description

The Fellow is able to help other members of their team adapt to change and recognize its value

Output

After attaining this skill, and as a demonstration of it, a person should be able to create the following:

1. A adaptability log describing multiple instances where the team had to adapt to/push back on changes

Objectives

Knowledge

Knowledge Unit	Studied Applied	
I can describe the following from memory:		
* How to foster team adaptability	<input type="checkbox"/>	<input type="checkbox"/>
* Benefits of having an adaptable team	<input type="checkbox"/>	<input type="checkbox"/>
* What are your team members' limits to adaptability	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced	Observed
Context: When goals and objectives of the company/project change Action: I facilitate discussions with team members in order to help them understand the reasons behind the changes and adapt better	<input type="checkbox"/>	<input type="checkbox"/>
Context: When new information that may influence project approach arises Action: I present new information to the team with explanations on how it could influence the current project approach	<input type="checkbox"/>	<input type="checkbox"/>
Context: After my team has had the opportunity to process the new information Action: I help them manage their response to it	<input type="checkbox"/>	<input type="checkbox"/>
Context: After my team has responded to the new information Action: I record their response (adapting or pushing back to change)	<input type="checkbox"/>	<input type="checkbox"/>
Context: When my team members respond to change Action: I give them feedback on their decision	<input type="checkbox"/>	<input type="checkbox"/>
Context: When discussing new or different project or problem solving approaches Action: I help the team see the pros and cons of the different approaches	<input type="checkbox"/>	<input type="checkbox"/>
Context: When a decision about adopting a new or different approach has been made Action: I support the team in understanding the approach and the reasons why it was decided upon	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt	Demonstrated
People adapt better and faster to changes when they understand the reasons/motivations behind the changes	<input type="checkbox"/>	<input type="checkbox"/>

Outcome 17 – Decision Making

Skill Description

The Fellow is able to facilitate group discussions and lead them towards making decisions. They do this by controlling the flow of the discussions, keeping everyone on track, ensuring that all relevant points are made, weighed as needed and that the group is able to reach consensus based

off of those points.

Output

After attaining this skill, and as a demonstration of it, a person should be able to create the following:

1. Discussion/team meeting notes highlighting objectives of discussion, and action points (agreed upon by team) that suggest steps towards resolution of the objectives

Objectives

Knowledge

Knowledge Unit	Studied Applied	
I can describe the following from memory:		
* How to facilitate team discussions to make decisions	<input type="checkbox"/>	<input type="checkbox"/>
* Factors that derail meeting objectives and methods to bring them back on course	<input type="checkbox"/>	<input type="checkbox"/>
* How do you prepare for facilitating group discussions/meetings	<input type="checkbox"/>	<input type="checkbox"/>
* How to weigh the value of relevant points when making a decision	<input type="checkbox"/>	<input type="checkbox"/>
* The parties (stakeholders and other people) impacted by your team's decisions	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced Observed	
Context: Before scheduling group discussions Action: I create an agenda and desired outcomes for the discussion	<input type="checkbox"/>	<input type="checkbox"/>
Context: When scheduling group discussions Action: I send agenda items and desired outcomes to all participants	<input type="checkbox"/>	<input type="checkbox"/>
Context: At the start of group discussions Action: I ensure that notes are being taken by a team representative (could be me)	<input type="checkbox"/>	<input type="checkbox"/>
Context: When facilitating group discussions Action: I don't let the group get side-tracked with aimless debates for more than 5 minutes	<input type="checkbox"/>	<input type="checkbox"/>
Context: When there are outstanding questions/topics that may take long to resolve Action: I ask the note-taker to document them for further discussion at the end of the meeting (if there's time) or at a later discussion	<input type="checkbox"/>	<input type="checkbox"/>
Context: When facilitating group discussions Action: I identify who in the group is speaking freely and who may need more time to think and contribute	<input type="checkbox"/>	<input type="checkbox"/>
Context: When facilitating group discussions Action: I invite the less talkative team members to share their thoughts	<input type="checkbox"/>	<input type="checkbox"/>
Context: When facilitating group discussions Action: I continue to push the group to stick to the point of the discussion always save time at the end to resolve/commit to next steps	<input type="checkbox"/>	<input type="checkbox"/>
Context: When facilitating group discussions Action: I make sure that the	<input type="checkbox"/>	<input type="checkbox"/>

discussion ends with some form of consensus/decision/next step

Context: When soliciting team input into a key decision **Action:** I offer the same prompt to each team member requesting they add their unique perspective to the decision making process [] []

Context: When leading new team members on a project **Action:** I keep track of the decision making inputs each of them offers to the group until I'm confident everyone is being heard [] []

Context: When I receive input towards making a decision **Action:** I consider the input with other stakeholders' perspectives in mind [] []

Context: When I receive input towards making a decision **Action:** I weigh the inputs against the outcomes of the desired decision [] []

Beliefs

Embodied Belief	Felt Demonstrated	
Team members put more effort in their work when they feel that they are part of the decision making process	[]	[]
Setting and communicating the desired outcome for a discussion/meeting guides the meeting towards a resolution	[]	[]
Having a clear agenda frames a discussion for organization and productivity	[]	[]
A decision made using each team member's input is better than a decision made by a single member or a subset of the team	[]	[]
Careful consideration of inputs now will save future headaches	[]	[]

Outcome 10 – Problem Solving & Critical Thinking

Skill Description

The Fellow is able to display logical reasoning by drawing inferences that can be correlated to facts gathered, and prediction by extrapolating potential outcomes of solutions to identify risks and unintended consequences.

Output

After attaining this skill, and as a demonstration of it, a person should be able to create the following:

1. A risk assessment document that covers observations, assumptions, and predictions of a potential decision on a project

Objectives

Knowledge

Knowledge Unit

Studied Applied

I can describe the following from memory:

* Definition of inferences, extrapolation, logical reasoning	<input type="checkbox"/>	<input type="checkbox"/>
* Types of data that support problem solving	<input type="checkbox"/>	<input type="checkbox"/>
* Roles of observations, assumptions and predictions in risk assessment	<input type="checkbox"/>	<input type="checkbox"/>
* How to draw inferences from limited data	<input type="checkbox"/>	<input type="checkbox"/>
* How to extrapolate potential outcomes for a situation	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced	Observed
Context: When I am solving a problem Action: I gather facts to support my solution design	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I gather facts Action: I draw inferences based on those facts	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I present ideas/solutions Action: I present them with facts that the solutions are based on and facts that the ideas could be correlated with	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I present ideas/solutions Action: I offer multiple predicted outcomes	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I make predictions/recommendations Action: I highlight potential pitfalls of the recommendations and address them	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I encounter new problems Action: I consider and leverage solutions/results from my prior experiences that may be similar	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt	Demonstrated
My ideas will be more compelling if they are based on facts, offer multiple predicted outcomes, and address potential pitfalls	<input type="checkbox"/>	<input type="checkbox"/>
Risk is inevitable, it is my job to anticipate potential risks and work to mitigate their impact	<input type="checkbox"/>	<input type="checkbox"/>
It is rare to know all the facts before making a decision and that it is okay to make a decision based on assumptions and inferences	<input type="checkbox"/>	<input type="checkbox"/>
My prior experiences are a valuable resource for making effective inferences in new situations	<input type="checkbox"/>	<input type="checkbox"/>

Outcome 19 – Writing Professionally

Skill Description

The Fellow is adept at writing communications to senior management focused on highlighting key issues and calls for action.

Output

After attaining this skill, and as a demonstration of it, a person should be able to create the following:

1. A report on team members (including reflections and people recommendations/progress reports)
2. A report/presentation on product state (including product recommendations)

Objectives

Knowledge

Knowledge Unit	Studied Applied	
I can describe the following from memory:		
* The concerns/considerations of my senior management team members	<input type="checkbox"/>	<input type="checkbox"/>
* Types of reports in software teams	<input type="checkbox"/>	<input type="checkbox"/>
* Venues for written communication with senior management and their respective uses (e.g. slack, email, documents)	<input type="checkbox"/>	<input type="checkbox"/>
* Methods for highlighting key issues and calls for action in writing	<input type="checkbox"/>	<input type="checkbox"/>
* How to summarize complex topics into a few key bullet points	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced Observed	
Context: When I send written communication to senior management Action: I consider their perspective and write with the appropriate type, level, and depth of information	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I write reports Action: I highlight the key issues and calls for action in a concise and easily understandable manner	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am cc'ed on communications with senior team members Action: I carefully evaluate where my inputs will provide value-add	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt Demonstrated	
The quality of my written communication is a reflection of my level of professionalism	<input type="checkbox"/>	<input type="checkbox"/>
Reports that have calls for action backing up the issues are likely to be better received and acted upon	<input type="checkbox"/>	<input type="checkbox"/>
I can command respect from senior management by communicating with concise and insightful reports	<input type="checkbox"/>	<input type="checkbox"/>

Outcome 20 – Holistic & Big Picture Thinking

Skill Description

The Fellow is able to understand the work that needs to be delivered by multiple members of a team, see how it all fits together toward the completion of a goal, and engage with stakeholders/members of the team from that perspective

Output

After attaining this skill, and as a demonstration of it, a person should be able to create the following:

1. A detailed report describing the interrelations between product vision, stakeholder needs, and the current state of team progress

Objectives

Knowledge

Knowledge Unit	Studied Applied	
I can describe the following from memory:		
* Business motivators & drivers	<input type="checkbox"/>	<input type="checkbox"/>
* How to identify company/team goals, mission and vision	<input type="checkbox"/>	<input type="checkbox"/>
* The role of every team member and their current responsibilities	<input type="checkbox"/>	<input type="checkbox"/>
* How every team member's work fits together to business/company goals	<input type="checkbox"/>	<input type="checkbox"/>
* The priority and importance of my team's work relative to other initiatives important to my key stakeholders	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced Observed	
Context: Every sprint period Action: I keep all team members informed of what they are all working on and how their work intersects	<input type="checkbox"/>	<input type="checkbox"/>
Context: Every sprint period Action: I expose all team members to how their work contributes to the success of the project / client	<input type="checkbox"/>	<input type="checkbox"/>
Context: During sprint retrospectives Action: I ask my team where they think we are in relation to our quarterly goals and the overall product vision/scope	<input type="checkbox"/>	<input type="checkbox"/>
Context: When the team's work doesn't feel directionally aligned (with respect to the product big picture) to me Action: I engage my team members in helping me articulate the problem, discover the source, and address it as needed	<input type="checkbox"/>	<input type="checkbox"/>
Context: When engaging with stakeholders on initiatives/solutions Action: I consistently ask myself and others, "how does this fit into the bigger picture and connect with other people's work?" and use that question to inform the conversation	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt Demonstrated
I can create a collaborative environment by keeping my team members aware	

of each other's work	<input type="checkbox"/>	<input type="checkbox"/>
I am more confident sending team reports to senior management/stakeholders when I know what all my team members are working on	<input type="checkbox"/>	<input type="checkbox"/>
Accountability is fostered by keeping every team member aware of every other team member's tasks and responsibilities	<input type="checkbox"/>	<input type="checkbox"/>
Knowing how their work contributes to a greater goal helps keep team members motivated	<input type="checkbox"/>	<input type="checkbox"/>
I see the big picture and apply it in my daily interactions	<input type="checkbox"/>	<input type="checkbox"/>
My team is building the big picture	<input type="checkbox"/>	<input type="checkbox"/>

Output 21– Leadership

Skill Description

A person with this skill demonstrates leadership skills such as imparting knowledge and expertise to their team. They encourage a collaborative team environment, lead by example, and consistently help their team understand the vision of what needs to be built and why.

Output

- **Task:** Reflect on instances when you have led your team by example.
- **Resources:** Document using any medium you choose.
- **Include:** Share with your team for their feedback.

Knowledge

Knowledge Unit	Studied	Applied
How to lead by example on a development team	<input type="checkbox"/>	<input type="checkbox"/>
How to lead through using best practices in coding:		
– Structure	<input type="checkbox"/>	<input type="checkbox"/>
– REST properties	<input type="checkbox"/>	<input type="checkbox"/>
– Naming conventions	<input type="checkbox"/>	<input type="checkbox"/>
Best practices for active listening		
https://github.com/andela/learningmap/blob/master/Phase-C/Entry-level%20Developer/Curriculum/01%20-%20Active%20Listening/README.md	<input type="checkbox"/>	<input type="checkbox"/>
How to effectively impart knowledge and expertise to a team	<input type="checkbox"/>	<input type="checkbox"/>
How to help my team understand what needs to be built and why	<input type="checkbox"/>	<input type="checkbox"/>
Distinction between Management and Leadership	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced	Observed
Context: When team members help each other or work together to achieve something Action: I call out their collaboration as a point of celebration to encourage a collaborative environment	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I give feedback to junior team members Action: I provide		

context with specific scenarios and offer alternate(better) suggestions for better behavior in the future	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I write code for my team, Action: I lead by example by following best practices for structure, naming, and style conventions.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I test code on my team, Action: I lead by example by being extremely particular, commenting out and resolving every bug with a clean solution.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I make a mistake, Action: I admit it early and often!	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt Demonstrated	
Listening and collaborating are critical leadership skills.	<input type="checkbox"/>	<input type="checkbox"/>
As a D3 Developer I lead by example-- both in my team skills and the quality and consistency of my code.	<input type="checkbox"/>	<input type="checkbox"/>
As a D3 Developer, I am no longer simply an individual contributor. My role is to bring out the best in my team members.	<input type="checkbox"/>	<input type="checkbox"/>
The best part about gaining knowledge is being able to share it with others.	<input type="checkbox"/>	<input type="checkbox"/>
All development teams appreciate when a mistake is owned up to- it allows them to fix it faster.	<input type="checkbox"/>	<input type="checkbox"/>
Admitting my mistake and working to help fix it turns me into the hero.	<input type="checkbox"/>	<input type="checkbox"/>

Output 23– Maintaining and Sharing Knowledge

Skill Description

A person with this skill keeps on the absolute forefront of upcoming technologies and products. They are constantly exploring, playing with previews of new technologies, and practicing builds in new stacks. They have best-in-class research skills and can find the information needed to solve any problem. Most importantly, they share their knowledge with others daily through mentorship, conversation, and blogs.

Output

- **Task:** Reflect on a time that you needed to solve a programming problem that you did not know how to accomplish. Outline the research steps you took to uncover the needed information to build a solution.
- **Resources:** Use whatever medium you choose.
- **Include:** Share with your team.

Alternative Output

- **Task:** Make a list of blogs, sites, podcasts, and books that you learn from
- **Resources:** Use whatever medium you choose.
- **Include:** Share with your team so they, too, can learn from your sources!

Knowledge

Knowledge Unit	Studied	Applied
Best blogs to follow to stay on the cutting edge of new technologies	<input type="checkbox"/>	<input type="checkbox"/>
How to write a technical blog post (https://github.com/andela/learningmap/blob/master/Phase-C/Writing%20Blog%20Posts/Writing%20Technical%20Posts/README.md)	<input type="checkbox"/>	<input type="checkbox"/>
Where to publish a technical blog post	<input type="checkbox"/>	<input type="checkbox"/>
Respected authors in various programming stacks (for both blogs and books)	<input type="checkbox"/>	<input type="checkbox"/>
Essential books to read for computer programming (See list suggestion below)	<input type="checkbox"/>	<input type="checkbox"/>
How to play with previews of new technologies	<input type="checkbox"/>	<input type="checkbox"/>
How to maintain a personal blog	<input type="checkbox"/>	<input type="checkbox"/>
Why it is important to learn about the market a product is in	<input type="checkbox"/>	<input type="checkbox"/>
Where to learn about new products, new sectors, and new opportunities	<input type="checkbox"/>	<input type="checkbox"/>
How to learn from reading advanced developers' code	<input type="checkbox"/>	<input type="checkbox"/>
Steps to effectively research a solution to a new problem	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced	Observed
Context: When I am setting my daily schedule, Action: I always plan in time for learning and exploring.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I discover a new technology that interests me, Action: I dive in and play with it to explore how it works more deeply.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I discover something new or helpful through my own programming experience, Action: I share it widely with my team and through a blog post.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am writing a technical blog post, Action: I keep in mind my target audience and share the post through the site that will most effectively reach them.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am posting consistently on other networks, Action: I consider setting up a personal blog to share my programming insights.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am learning to improve in a particular language, Action: I look up the code of an expert developer and compare my code to theirs.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am playing with a new technology and do not have a use-case to build something with it, Action: I stay high level and keep it fun.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am learning a new technology to apply to a product or use-case, Action: I go deeper to research and learn all of the specifics I can.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I have a new problem that I do not know how to solve immediately, Action: I process the requirements and research possible technologies, processes, and tradeoffs.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am deciding on the most appropriate way to solve a new problem, Action: I choose the best technology and process given resource constraints and requirements.	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt Demonstrated	
Knowledge is useless if not shared.	<input type="checkbox"/>	<input type="checkbox"/>
The more I learn, the more there is to discover.	<input type="checkbox"/>	<input type="checkbox"/>
I am constantly growing through learning.	<input type="checkbox"/>	<input type="checkbox"/>
I ask the “why” behind the product itself to uncover things other developers may not have.	<input type="checkbox"/>	<input type="checkbox"/>

Resources

Some Recommended Books:

Structure and interpretation of computer programs
 Concepts techniques
 Models of computer programming
 Art of computer programming
 Database systems
 Thinking Forth
 Little Schemer

Outcome 22 – Mentorship

Skill Description

The Fellow demonstrates an ability to coach knowledge-seeking junior fellows/engineers in best practices in a manner that helps the mentee accelerate their knowledge/growth

Output

After attaining this skill, and as a demonstration of it, a person should be able to create the following:

1. Interaction log created by a Junior Developer confirming coaching and reinforcement of best practices by Technical Team Lead

Objectives

Knowledge

Knowledge Unit	Studied Applied	
I can describe the following from memory:		
* Cognitive Apprenticeship	<input type="checkbox"/>	<input type="checkbox"/>
* Pair Programming	<input type="checkbox"/>	<input type="checkbox"/>
* Positive Reinforcement	<input type="checkbox"/>	<input type="checkbox"/>
* Engineering best practices	<input type="checkbox"/>	<input type="checkbox"/>
* The difference between mentorship and other forms of teaching/leadership	<input type="checkbox"/>	<input type="checkbox"/>
* My philosophy on how people learn and grow	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced Observed	
Context: When I mentor junior engineers Action: I push them to figure out the answers by leveraging the resources around them	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I pair program with junior engineers Action: I hardly touch the keyboard	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am aware that junior Fellows are seeking knowledge that I have Action: I offer to mentor them	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I'm serving as a mentor and someone has a question Action: I answer like a friend, not a prophet	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am not being mentored by someone Action: I seek out a mentor	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am not mentoring anyone Action: I seek out opportunities to mentor	<input type="checkbox"/>	<input type="checkbox"/>
Context: Periodically throughout the mentorship relationship Action: I inquire and observe to get a sense of mentee progress and growth	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt Demonstrated	
I believe that mentorship is a vehicle for me to contribute back to the Fellowship	<input type="checkbox"/>	<input type="checkbox"/>
I believe that mentoring other developers accelerates and reinforces my learning	<input type="checkbox"/>	<input type="checkbox"/>
I will be most useful to the growth of my mentees by specifically considering their current role and future interests	<input type="checkbox"/>	<input type="checkbox"/>
Mentoring others helps me gain confidence	<input type="checkbox"/>	<input type="checkbox"/>

UI / UX Awareness & Design

Skill Description

A person with this skill is familiar enough with the principles of UI/UX design that they can identify a flaw in design and suggest improvements to it. They have spent enough time thoughtfully learning about and looking at product design that they have developed an intuition about good design, and can back it up with scientific or user research-driven data.

Output:

Taking your current product as an example, suggest 2–3 design improvements. Why would you change these? What design principles are you drawing on? How might you research these changes to see if they were impactful for your users?

Output 2:

Use a different product every day as an end user. As you use it, note the user stories you passed through, and any areas where there were flaws in design that you could improve. The more you do this, the more intuitive your design sense will become!

Knowledge

Knowledge Unit	Studied	Applied
Basic UX Principles	<input type="checkbox"/>	<input type="checkbox"/>
Basic Visual Design Principles	<input type="checkbox"/>	<input type="checkbox"/>
How to leverage design frameworks and style guides for scalability	<input type="checkbox"/>	<input type="checkbox"/>
How to leave space for variation and iteration in your design	<input type="checkbox"/>	<input type="checkbox"/>
Why speed and responsiveness matters in your product design	<input type="checkbox"/>	<input type="checkbox"/>
Distinction between wireframing, storyboarding, and mockups and when to use each	<input type="checkbox"/>	<input type="checkbox"/>
Definition of Feedback Loops in Design	<input type="checkbox"/>	<input type="checkbox"/>

Behaviors

Observable Behavior	Practiced	Observed
Context: When I am developing a product, Action: I must think about the user experience, not just the code.	<input type="checkbox"/>	<input type="checkbox"/>
Context: Whenever we are making a change to our product (scaling, etc), Action: I consider what impact it will have on the user and how we might need to change the design.	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I am looking at the design of a product, Action: I ask these questions:		
– Completeness: What are the feedback loops?	<input type="checkbox"/>	<input type="checkbox"/>
– Focus: Where is the call to action?	<input type="checkbox"/>	<input type="checkbox"/>
Context: When I'm designing a new product or program or a feature, Action: I begin by asking, "What am I solving for? and What will success look like?"	<input type="checkbox"/>	<input type="checkbox"/>

Beliefs

Embodied Belief	Felt	Demonstrated
Simplicity is paramount: The best design is no design.	<input type="checkbox"/>	<input type="checkbox"/>
No matter how technically sound my code is, the success of my product will depend on its usability.	<input type="checkbox"/>	<input type="checkbox"/>
A well defined problem statement, provides the clarity needed to pick the tools needed to solve it.	<input type="checkbox"/>	<input type="checkbox"/>
Design isn't just making things pretty. Design is everything we do.	<input type="checkbox"/>	<input type="checkbox"/>