Tangent AI Bootcamp - Practical Proficiency

Link: https://bootcamp.firstforai.co.za/

Introduction: A Framework for Assessing Real-World Automation Proficiency

This document presents a comprehensive framework for a full-day practical examination designed to assess the job-readiness of AI Bootcamp learners. The examination moves beyond rote knowledge testing to simulate the pressures, complexities, and professional expectations of a real-world automation development project. The core objective is to evaluate not only the learners' technical competence with n8n and AI agents but also their problem-solving abilities, design thinking, and professional communication skills—all of which are indispensable in customer-facing roles.

The curriculum, which includes foundational concepts from Harvard's CS50 course and practical training from n8n, emphasizes algorithmic thinking, data structures, and the efficient solution of problems.[1] This examination is the capstone assessment of those principles, testing their application in a tangible business context.

Philosophy of Progressive Difficulty

The examination is structured around a three-tiered challenge. This tiered approach is designed to be both inclusive and discerning. It allows every learner to build a functional core product (Tier 1), thereby demonstrating baseline competency. It simultaneously provides opportunities for high-achieving learners to showcase advanced skills in resilient system design (Tier 2) and sophisticated, interactive agentic workflows (Tier 3). This structure ensures that the exam can effectively differentiate between varying levels of proficiency, from a junior operator to a promising automation developer. The progression from simple data movement to intelligent processing and finally to interactive, human-supervised agency mirrors the maturity path of a professional in the automation field.

Prerequisites:

- A Laptop with Docker Desktop installed
- A Mobile Phone with Telegram installed and setup.
- A Private GMail Account that you can use for development and testing (Wither your own, or one you've created for this purpose)
- A Free ChatGPT Account (Setup with above email address)
- A Google Gemini AI API Key (Can be obtained for free here: https://aistudio.google.com)
- Example set of Invoices and Receipts (To be provided by Tangent)
- Mock ERP Endpoint API Key (Individual Key to be provided by Tangent)

Exam Day Schedule

The 8-hour examination day is meticulously structured to balance focused build time with critical presentation and review periods.

Time	Duration	Activity	Objective
09:00 - 09:30	30 mins	**Introduction & Briefing**	Set expectations, explain the exam structure, distribute materials, answer questions.
09:30 - 12:30	3 hours	**Build Session - Part 1 (Tiers 1 & 2)**	Learners set up their environment and build the core and resilient workflows.
12:30 - 13:00	30 mins	**Lunch Break**	
13:00 - 15:00	2 hours	**Build Session - Part 2 (Tier 3 & Refinement)**	Learners tackle the advanced task, debug, refine, and finalize documentation.
15:00 - 17:00	2 hours	**Demonstrations (8 mins per learner)**	Learners present their solutions, explaining their design choices and business value.

Part 1: Examination Environment and Prerequisite Setup

This initial phase, allocated for the first 30-45 minutes of the build session, is a test in itself. The ability to establish and manage a local development environment is a fundamental competency for any modern developer, indicating self-sufficiency and reducing reliance on pre-configured cloud platforms. Success in this phase demonstrates a critical skill set that is often a prerequisite for customer-site deployments.

Section 1.1: Local n8n Instance Deployment with Docker

Task: Learners must deploy a clean, local instance of n8n using Docker and Docker Compose. This is the mandatory first step of the examination.

Rationale: In a professional setting, developers frequently need to run services locally for testing, development, or deployment on client infrastructure. Proficiency with Docker is a non-negotiable skill that signals technical independence.[3] This task assesses the learner's ability to manage containerized applications, a standard practice in modern software development. It also serves to identify any local machine configuration issues early in the exam period.

Section 1.2: (Optional Bonus) Establishing Data Persistence with PostgreSQL

Task: As an optional bonus objective, learners are to connect their n8n instance to a separate PostgreSQL container for robust, production-grade data logging.

Rationale: This task is designed to differentiate learners who possess a deeper understanding of scalable and reliable system architecture. While n8n's default SQLite database is sufficient for simple use cases, production environments demand a more robust database solution like PostgreSQL.[7] Completing this task demonstrates an appreciation for separating the application layer from the data store, a critical concept for ensuring data integrity, scalability, and enabling more advanced features like vector storage for AI applications.[8]

Section 1.3: The Examiner's Toolkit: Mock Services and Test Data

To ensure a standardized and fair testing environment, learners will be provided with a controlled set of resources. This eliminates variables outside the learner's control, such as the unreliability of live third-party APIs.

Mock ERP API Endpoint: A stable, predictable, and fake Enterprise Resource Planning (ERP) API endpoint is essential for testing the final stage of the primary workflow. Using a mock API ensures that a learner's success is contingent upon their workflow logic, not the uptime or rate limits of an external service.[9]

Test Data Package: Learners will receive a single ZIP file containing a curated set of test documents. This package will include a variety of formats and types to rigorously test the classification and data extraction logic of their workflows. The package will contain:

- 5 Invoices (PDF format)
- 3 Receipts (JPG format)

Table: Mock ERP API Specification (/api/v1/transactions)

This specification provides absolute clarity on the API contract for the mock ERP system, removing ambiguity and allowing learners to focus on generating the correct request payload.

Parameter	Description
Endpoint URL	https://jurumani.app.n8n.cloud/webhook/automation-exam-250617
HTTP Method	POST
Headers	Content-Type: application/json, X-API-Key: <provided-static-key>
Request Body	{"transactionId": "string", "vendorName": "string", "amount": number, "transactionDate": "YYYY-MM-DD"}
Success Response (201)	{"status": "success", "message": "Transaction recorded", "id": "uuid"}

Error Response (400)	{"status": "error", "message": "Invalid data provided"}
Error Response (401)	{"status": "error", "message": "Unauthorized"}

Part 2: The Practical Examination: A Three-Tiered Challenge

This four-hour build session forms the core of the practical examination. The tasks are designed to be completed sequentially, with each tier building upon the last, reflecting an increasing level of complexity and professional maturity.

Section 2.1: Tier 1 - Foundational Automation Pipeline

Task: Learners must construct the foundational end-to-end financial document processing workflow. This workflow must be triggered by new emails in a Gmail account, but only process those that contain attachments. The attachment must be saved to a designated folder in Google Drive, and the corresponding email in Gmail must be tagged with a "Processed" label while being left in an unread state.

Rationale: This tier assesses the learner's command of n8n fundamentals. It tests their ability to configure triggers, use credentials for service authentication, and implement basic conditional logic and actions.[13] Successfully completing this tier demonstrates that the learner can build a simple but functional data-moving automation, which is the baseline requirement for the role.

Key Nodes: Gmail Trigger, If (to check for the presence of attachments), Google Drive (to upload the file), Gmail (to apply a label).

Section 2.2: Tier 2 - Intelligent Processing and Resilient Design

Task: Learners must enhance the Tier 1 workflow by integrating intelligence and robust design patterns. This involves several key upgrades:

1. **Dynamic Routing:** Implement a Switch node to create branching logic. Documents should be routed to different subfolders within Google Drive based on their file type (e.g., .../invoices, .../receipts) based on keywords found in the email subject line (e.g., "Invoice", "Receipt", "Statement") or the document itself.
2. **AI-Powered Data Extraction:** Utilize an AI node (e.g., Gemini Model) to perform

Optical Character Recognition (OCR) and extract structured data from the content of the document attachments. The prompt engineering should be designed to reliably extract key fields such as Vendor Name, Transaction Date, and Total Amount, preferably in a structured JSON format to simplify downstream processing.[14]

3. **Data Persistence:** The structured data extracted by the AI must be appended as a new row to a designated Google Sheet for logging and analysis.
4. **ERP Integration:** The core extracted data (e.g., Vendor, Date, Amount) must be sent to the Mock ERP API endpoint using an HTTP Request node.
5. **Robust Error Handling:** Critical nodes, specifically the AI call and the ERP API call, must be wrapped in a mechanism to handle failures gracefully. An effective implementation would use n8n's Try/Catch capabilities or a dedicated error workflow. Upon failure, the workflow should not halt but should instead trigger a notification (e.g., via email) containing details of the error, the failed execution, and the input data that caused the failure.[15]

Rationale: This tier distinguishes a developer who can build a simple prototype from one who can design a usable, intelligent, and reliable solution. It directly tests the core "AI Agent" skills from the bootcamp, including data transformation, prompt engineering, and, most critically, designing for failure. A production-ready workflow must be resilient to transient API errors and provide clear diagnostics when issues arise.[15]

Key Nodes: Switch, OpenAI Chat Model, Google Sheets, HTTP Request, Try/Catch blocks (or configuration of the "Continue on Fail" and "Error Workflow" settings).

Section 2.3: Tier 3 - Advanced Agentic Patterns: Human-in-the-Loop (HITL)

Task: Learners must implement an advanced human approval step for high-value transactions. The logic must state that if an extracted invoice amount exceeds a specified threshold (e.g., $1,000), the workflow must pause before submitting the transaction to the ERP. The workflow must:

1. **Pause Execution:** Halt the workflow's progress temporarily.
2. **Request Approval:** Dispatch a notification to a designated approver (via email or a messaging platform like Telegram). This notification must be clear and actionable, presenting the key invoice details (Vendor, Amount, Date) and providing two distinct options, such as clickable links or buttons, for "Approve" and "Reject".

3. **Wait for Response:** The workflow must remain in a waiting state until the human approver interacts with one of the provided options.
4. **Conditional Resumption:** The workflow's subsequent actions must be contingent on the human's response. If "Approve" is selected, the workflow resumes and calls the ERP API. If "Reject" is selected, the workflow should log the rejection and terminate gracefully, perhaps sending a final notification to the original user.

Rationale: This tier represents the apex of the examination, testing the learner's ability to design complex, asynchronous workflows that skillfully blend automation with essential human judgment. This capability is exceptionally valuable in real-world business process automation, where not all decisions can or should be fully automated.[17] Successfully implementing a HITL pattern demonstrates a sophisticated understanding of process design and the practical needs of business users.[19]

Key Nodes: If (to check the transaction amount), Wait (configured to resume on webhook call), Send Email (with dynamically generated approval/rejection webhook URLs), Webhook (to receive the response and resume the flow). Alternatively, n8n's dedicated Human in the Loop node can be used if learners are familiar with it.[21]

Part 3: The Demonstration and Professional Documentation

The final two hours are dedicated to assessing skills that are as crucial as technical prowess: communication and documentation. A brilliant automation that cannot be understood, maintained, or explained has limited value in a collaborative or client-facing environment.

Section 3.1: The Art of the Technical Demonstration

Task: Each learner is allocated 8 minutes to present their completed solution. This is not a simple screen share but a structured presentation designed to communicate the value and design of their work.

Evaluation Criteria: The demonstration will be assessed against criteria that reflect best practices for effective technical communication.[23]

1. **The Narrative (The "Why"):** The presentation must begin by framing the business problem. The learner should articulate the pain points the automation is

designed to solve (e.g., "The finance team was spending excessive manual hours on invoice data entry, leading to errors and delays").

2. **The Solution (The "How"):** The learner must provide a clear, concise walkthrough of their n8n workflow. This should not be a node-by-node recitation but a high-level explanation of key design choices (e.g., "I chose a Switch node here to create separate processing paths for invoices and receipts, ensuring they are stored correctly. The AI prompt was engineered to return structured JSON, which eliminated the need for complex data parsing later in the flow.").

3. **The Value (The "So What"):** The presentation must conclude by summarizing the tangible business value delivered by the automation. This includes benefits like time saved, error reduction, improved data accuracy, and enhanced visibility into financial operations.

4. **Clarity and Engagement:** The overall delivery should be professional, clear, and engaging. The learner should be prepared to answer questions about their design choices and potential limitations.

Section 3.2: Professional-Grade Workflow Documentation

Task: Learners must submit their final workflow accompanied by clear, concise, and professional documentation in the form of a README.md file.

Evaluation Criteria: High-quality documentation is essential for workflow handoff, maintenance, and future development.[26] The submitted documentation will be evaluated on its clarity, completeness, and utility for another developer. It must include:

1. **High-Level Overview:** A brief paragraph describing the workflow's purpose, key features, and the business problem it solves.

2. **Setup and Configuration:** A clear, step-by-step guide on how to set up the workflow. This must include a list of all required credentials (e.g., Gmail, Google Drive, OpenAI API Key) and instructions on how to configure them within n8n. Any necessary environment variables must also be documented.

3. **Workflow Logic Breakdown:** An explanation of the key logical sections of the workflow. This should detail the purpose of the main branches (Switch node), the prompt engineering strategy for the AI nodes, and a description of how the Human-in-the-Loop mechanism functions. Adhering to best practices like giving each node a descriptive name is mandatory for clarity.[28]

4. **Error Handling Strategy:** A dedicated section that explains how the workflow identifies and manages potential errors, including what happens when an API call

fails and how notifications are triggered.

Part 4: Evaluation Framework and Assessment Rubric

Objective and standardized evaluation is paramount to a fair assessment process. This framework provides clear criteria for grading each component of the examination, allowing for consistent scoring across all learners and providing a basis for constructive feedback.

Section 4.1: Scoring Criteria and Proficiency Levels

- **Novice:** Demonstrates a basic, often incomplete, understanding. Able to follow simple instructions but struggles with independent problem-solving, complex logic, and error handling.
- **Competent:** Can build a functional workflow that meets the core requirements (Tier 1). The solution works but may lack robustness, efficiency, and advanced features.
- **Proficient:** Delivers a robust and intelligent solution that meets all requirements through Tier 2. The workflow includes effective data extraction and solid error handling. Documentation and presentation are clear and professional.
- **Expert:** Masters all tiers of the challenge, including the complex HITL scenario. The solution is not only functional but elegant, resilient, and efficient. Demonstrates exceptional problem-solving, communication, and documentation skills.

Section 4.2: Comprehensive Assessment Rubric

This rubric provides a detailed scoring matrix for each assessed category.

Category	Novice (0-5 pts)	Competent (6-10 pts)	Proficient (11-15 pts)	Expert (16-20 pts)
Environment Setup	Fails to set up a functional Docker instance.	Sets up Docker instance but struggles with configuration or requires significant help.	Successfully sets up the n8n Docker instance independently.	Sets up the n8n Docker instance and successfully completes the bonus Postgres integration with correct environment variable configuration.[7]
Tier 1: Functionality	Workflow is incomplete, fails on basic tasks, or does not meet core requirements.	Workflow processes emails but has significant logical flaws or bugs.	The Tier 1 workflow is fully functional, correctly processing emails with attachments and applying labels as required.[13]	The Tier 1 workflow is flawless and includes minor, thoughtful enhancements such as dynamic file naming based on date or sender.
Tier 2: Intelligence & Resilience	Does not attempt or fails to implement AI data extraction or error handling.	Implements a basic AI call with poor prompt engineering leading to unstructured or inaccurate data. Error handling is absent or ineffective.	Successfully extracts structured data using AI. Implements Try/Catch or equivalent error handling on critical API and AI nodes.[15]	Uses advanced prompt engineering to request structured JSON output from the AI. Implements a comprehensive error path that sends detailed, useful notifications upon failure.[14]
Tier 3: HITL	Does not attempt the Tier	Attempts the HITL workflow,	Delivers a functional HITL	Delivers a polished and

	3 challenge.	but the logic is broken, incomplete, or does not pause/resume correctly.	workflow that correctly pauses and resumes based on interaction with the approval/rejection links.[18]	robust HITL workflow with clear instructions in the approval request and clean, well-documented logic for both the approve and reject paths.[19]
Documentation	Submits only the exported workflow JSON or no documentation at all.	Provides minimal documentation that is unclear, incomplete, or difficult to follow.	Submits a clear README.md file covering setup, credentials, and basic workflow logic. Nodes are descriptively named.[28]	Submits exhaustive documentation that follows all best practices, enabling another developer to understand, set up, and maintain the workflow with ease.[26]
Demonstration	The demonstration is unstructured, confusing, and purely a technical screen share with no business context.	Explains what the workflow does but fails to connect the technical features to business value or solve a stated problem.	Delivers a clear, structured presentation that effectively explains the business problem ("why"), the solution ("how"), and the value ("so what").[23]	Delivers a compelling, engaging narrative that perfectly balances business context and technical detail, demonstrating superior communication skills and professional polish.[25]

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