## Business Statement / Functional Narrative / Scope

**What does the system do:**  
The ACME Anvils Order Taking app lets a clerk take a single order for anvils from a customer. It starts by asking the clerk’s name, shows a welcome message, collects customer shipping info and anvil quantity, calculates the cost (with tiered pricing, tax, and shipping), and prints a neatly formatted invoice. It’s built for one order per run—clerks restart it for each new order. This tool keeps ACME’s cartoon villain customers equipped with anvils, maintaining their 50+ year legacy.

Scope

* Collect the clerk’s name and customer order details.
* Calculate costs (subtotal, tax, shipping) and display an invoice matching the sample output.
* Handle one order per execution with pauses before invoice and exit.

## Assumptions

* The clerk enters valid data (no validation required for Version 1).
* Console environment supports basic formatting (spaces, newlines).
* Pricing: $88.50 (1–9), $70.00 (10–19), $68.25 (20+); Tax: 9.5%; Shipping: $112/anvil unless free (CA/OR, <5 anvils).
* Sample output formatting supersedes minor spec inconsistencies (e.g., prompt wording).

## User Stories

* **As a clerk**, I want to enter my name, so it appears on the invoice.
* **As a clerk**, I want a welcome message with stars and the motto for branding.
* **As a clerk**, I want to input order details with specific prompts on the same line as responses.
* **As a clerk**, I want an invoice showing all costs and shipping details in a boxed format.
* **As a clerk**, I want pauses to control when the invoice appears, and the program ends.

## Use Case Scenarios

**Use Case 1: Placing a Standard Order**

**Actors:**

* Clerk (Primary Actor)

**Preconditions:**

* The system is launched, and the clerk is ready to take an order.

**Main Flow:**

1. The system prompts the clerk for their name.
2. The system displays a welcome message with the ACME slogan.
3. The system asks for the number of anvils to order.
4. The clerk enters a valid number of anvils.
5. The system requests the customer's shipping details (name, address, city, state, zip).
6. The clerk enters the customer’s information.
7. The system calculates the total cost, including tax and shipping.
8. The system prompts the clerk to press a key to display the invoice.
9. The system displays the invoice with all order details.
10. The system thanks the user with a promotional slogan.
11. The system prompts the clerk to press a key to end the program.

**Postconditions:**

* The order details are displayed successfully.
* The clerk is prompted to restart a new order.

**Use Case 2: Ordering Less Than 5 Anvils in CA or OR (Free Shipping)**

**Actors:**

* Clerk (Primary Actor)

**Preconditions:**

* The system is launched, and the clerk is ready to take an order.
* The customer is located in **California (CA) or Oregon (OR)**.
* The customer orders fewer than **5 anvils**.

**Main Flow:**

1. The clerk enters a valid number of anvils (1-4).
2. The clerk provides the customer’s shipping address, including **CA or OR** as the state.
3. The system calculates the total cost, including tax but **waives shipping fees**.
4. The system displays a message: **"Congratulations! You qualify for FREE SHIPPING!"**.
5. The invoice is displayed with a shipping cost of **$0.00**.
6. The system thanks the user and ends the session.

**Postconditions:**

* The invoice reflects **free shipping**.
* The order total is correctly calculated.

**Use Case 3: Ordering 10+ Anvils for Discounted Pricing**

**Actors:**

* Clerk (Primary Actor)

**Preconditions:**

* The system is launched, and the clerk is ready to take an order.
* The customer orders **10 or more anvils**.

**Main Flow:**

1. The clerk enters a number **between 10 and 19**.
2. The system applies to the **discounted price of $70.00 per anvil**.
3. The system calculates subtotal, tax, and shipping fees.
4. The system generates the invoice with the discounted price per anvil.
5. The system displays the invoice and thanks the user.

**Postconditions:**

* The invoice reflects the correct discounted price.

**Use Case 4: Ordering 20+ Anvils for Bulk Discount**

**Actors:**

* Clerk (Primary Actor)

**Preconditions:**

* The system is launched, and the clerk is ready to take an order.
* The customer orders **20 or more anvils**.

**Main Flow:**

1. The clerk enters **20 or more anvils**.
2. The system applies to the **bulk discount of $68.25 per anvil**.
3. The system calculates subtotal, tax, and shipping fees.
4. The system generates the invoice with the bulk discount pricing.
5. The system displays the invoice and thanks the user.

**Postconditions:**

* The invoice reflects the correct bulk discount.

**Use Case 5: Invalid Data Entry (Optional - If Validation Is Implemented)**

**Actors:**

* Clerk (Primary Actor)

**Preconditions:**

* The system is launched.

**Main Flow:**

1. The clerk enters **an invalid number of anvils** (e.g., negative number, letters).
2. The system displays an **error message** and asks for a valid input.
3. The clerk enters **an invalid zip code** (e.g., non-numeric characters).
4. The system displays an **error message** and requests re-entry.
5. The system only proceeds once all inputs are valid.

**Postconditions:**

* The system handles errors properly and prevents invalid data submission.

## Test Plans & Supporting Bases

**1. Truth Tables (Logical Rules for Order Processing)**

A **Truth Table** represents different scenarios of free shipping eligibility.

|  |  |  |
| --- | --- | --- |
| **Anvils Ordered** | **State (CA/OR)** | **Free Shipping Applied?** |
| 1-4 | CA | Yes |
| 1-4 | OR | Yes |
| 1-4 | AZ | No |
| 5+ | CA | No |
| 5+ | OR | No |
| 10+ | Any State | No |

**2. Decision Table (Pricing and Tax Calculation Rules)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Condition** | **1-9 Anvils** | **10-19 Anvils** | **20+ Anvils** | **CA/OR & <5 Anvils** | **Shipping Charge** | **Tax (9.5%) Applied?** |
| Scenario 1: Order 3 anvils in CA | $88.50 each | - | - | Yes | $0.00 | Yes |
| Scenario 2: Order 10 anvils in AZ | - | $70.00 each | - | No | $112 per anvil | Yes |
| Scenario 3: Order 25 anvils in TX | - | - | $68.25 each | No | $112 per anvil | Yes |

**3. Boundary Value Analysis (BVA) Table**

**Testing boundary conditions for order quantity**:

|  |  |  |
| --- | --- | --- |
| **Test Case** | **Input Value** | **Expected Outcome** |
| Min Order | 1 | Correct price tier applied |
| Just Below Discount | 9 | $88.50 per anvil |
| First Discount Threshold | 10 | $70.00 per anvil |
| Just Below Bulk Discount | 19 | $70.00 per anvil |
| Bulk Discount Threshold | 20 | $68.25 per anvil |
| Extreme Large Order | 1000 | System handles large numbers correctly |

**4. Equivalence Partitioning (EP) Table**

Dividing the order values into **equivalence classes** to test representative cases:

|  |  |  |  |
| --- | --- | --- | --- |
| **Partition** | **Valid/Invalid** | **Test Input** | **Expected Result** |
| Small Order | Valid | 3 anvils | Price = $88.50 per anvil |
| Mid-Tier Order | Valid | 15 anvils | Price = $70.00 per anvil |
| Bulk Order | Valid | 25 anvils | Price = $68.25 per anvil |
| Invalid Negative Order | Invalid | -1 anvils | Error Message |
| Non-Numeric Input | Invalid | "ten" anvils | Error Message |

**5. State Transition Diagram**

**States:**

1. **Start** → Clerk enters name
2. **Order Entry** → Clerk inputs number of anvils
3. **Customer Info** → Clerk enters shipping details
4. **Calculation** → System computes price, tax, and shipping
5. **Invoice Display** → Invoice is shown to the user
6. **End**

**Transitions:**

* **Valid input → next state**
* **Invalid input → retry state**
* **Final invoice display → end state**

**6. Dependency Graphs**

Illustrating dependency between different modules:

1. **Order Input** ⟶ **Price Calculation** ⟶ **Tax Calculation** ⟶ **Shipping Calculation** ⟶ **Invoice Generation**
2. Free Shipping Rule **depends** on **Order Input** and **State Selection**.
3. **Invoice Formatting** depends on all previous calculations.

(*Graph will be created to show these relationships.*)

**7. Code Review Records**

To ensure software quality, code reviews will focus on:

* Correctness of calculation logic.
* Proper formatting of outputs.
* Handling of all expected and unexpected inputs.
* Adherence to coding standards.

Review records will include:

* Review comments.
* Bug fixes.
* Approval status.

## Test Cases

**1. Use Case: Clerk Enters Name**

**Test Case 1.1: Validate Clerk Name Entry**

**Test Case ID**: TC-01  
**Use Case ID**: UC-01  
**Description**: Verify that the application correctly prompts for and accepts the clerk’s name.  
**Preconditions**: The application is launched.  
**Test Steps**:

1. Launch the application.
2. Enter a valid name (e.g., "John Doe").
3. Verify that the name is displayed in subsequent prompts.  
   **Expected Result**: Clerk’s name is correctly stored and displayed.

**2. Use Case: Collect Number of Anvils**

**Test Case 2.1: Validate Correct Anvil Quantity Input**

**Test Case ID**: TC-02  
**Use Case ID**: UC-02  
**Description**: Ensure correct input handling for anvil quantity.  
**Preconditions**: Clerk's name has been entered.  
**Test Steps**:

1. Enter a valid number of anvils (e.g., 10).
2. Verify that the input is accepted and stored.  
   **Expected Result**: System accepts input and moves to the next prompt.

**Test Case 2.2: Invalid Anvil Quantity (Negative or Zero)**

**Test Case ID**: TC-03  
**Use Case ID**: UC-02  
**Description**: Ensure negative or zero values are not accepted.  
**Preconditions**: Clerk's name has been entered.  
**Test Steps**:

1. Enter "-5" as the number of anvils.
2. Verify the system displays an error message.  
   **Expected Result**: System rejects negative or zero values.

**Test Case 2.3: Invalid Anvil Quantity (Non-Numeric Input)**

**Test Case ID**: TC-04  
**Use Case ID**: UC-02  
**Description**: Verify system behavior for non-numeric input.  
**Preconditions**: Clerk's name has been entered.  
**Test Steps**:

1. Enter "ten" as the number of anvils.
2. Verify the system displays an error message.  
   **Expected Result**: System rejects non-numeric input.

**3. Use Case: Collect Customer Information**

**Test Case 3.1: Validate Customer Information Input**

**Test Case ID**: TC-05  
**Use Case ID**: UC-03  
**Description**: Ensure that the system correctly collects customer details.  
**Preconditions**: Clerk has entered the number of anvils.  
**Test Steps**:

1. Enter a valid name: "Wile E. Coyote".
2. Enter a valid address: "25 S. Main St., Sedona, AZ, 83633".  
   **Expected Result**: System accepts valid inputs and moves to calculation step.

**4. Use Case: Calculate Order Subtotal**

**Test Case 4.1: Verify Price Calculation for 1-9 Anvils**

**Test Case ID**: TC-06  
**Use Case ID**: UC-04  
**Description**: Validate that the system applies the correct price tier.  
**Preconditions**: Order placed for 5 anvils.  
**Test Steps**:

1. Enter "5" anvils.
2. Verify subtotal calculation: 5 × $88.50 = $442.50.  
   **Expected Result**: Correct subtotal is displayed.

**Test Case 4.2: Verify Price Calculation for 10-19 Anvils**

**Test Case ID**: TC-07  
**Use Case ID**: UC-04  
**Description**: Verify correct price tier application.  
**Preconditions**: Order placed for 15 anvils.  
**Test Steps**:

1. Enter "15" anvils.
2. Verify subtotal calculation: 15 × $70.00 = $1,050.00.  
   **Expected Result**: Correct subtotal is displayed.

**Test Case 4.3: Verify Price Calculation for 20+ Anvils**

**Test Case ID**: TC-08  
**Use Case ID**: UC-04  
**Description**: Verify bulk order pricing.  
**Preconditions**: Order placed for 25 anvils.  
**Test Steps**:

1. Enter "25" anvils.
2. Verify subtotal calculation: 25 × $68.25 = $1,706.25.  
   **Expected Result**: Correct subtotal is displayed.

**5. Use Case: Apply Sales Tax**

**Test Case 5.1: Validate Tax Calculation (9.5%)**

**Test Case ID**: TC-09  
**Use Case ID**: UC-05  
**Description**: Ensure tax is correctly calculated.  
**Preconditions**: Order subtotal is known.  
**Test Steps**:

1. Order subtotal is "$1,050.00".
2. System calculates tax: 9.5% of $1,050.00 = $99.75.  
   **Expected Result**: Tax is correctly calculated and displayed.

**6. Use Case: Apply Shipping Charges**

**Test Case 6.1: Verify Free Shipping for CA/OR Orders < 5 Anvils**

**Test Case ID**: TC-10  
**Use Case ID**: UC-06  
**Description**: Ensure free shipping is applied correctly.  
**Preconditions**: Customer orders 4 anvils and lives in CA.  
**Test Steps**:

1. Enter "4" anvils.
2. Enter state as "CA".
3. Verify shipping charge is "$0.00" with a free shipping message.  
   **Expected Result**: Free shipping applied.

**Test Case 6.2: Verify Standard Shipping Charges**

**Test Case ID**: TC-11  
**Use Case ID**: UC-06  
**Description**: Ensure correct shipping charge is applied.  
**Preconditions**: Order placed for 10 anvils.  
**Test Steps**:

1. Enter "10" anvils.
2. Verify shipping charge: 10 × $112 = $1,120.  
   **Expected Result**: Correct shipping cost applied.

**7. Use Case: Display Invoice**

**Test Case 7.1: Verify Invoice Formatting**

**Test Case ID**: TC-12  
**Use Case ID**: UC-07  
**Description**: Ensure invoice is correctly formatted.  
**Preconditions**: Order is completed.  
**Test Steps**:

1. System generates invoice.
2. Verify all details (customer info, items, cost breakdown, shipping, tax, total).  
   **Expected Result**: Invoice matches expected format.

## Activity Flow

A screenshot of a diagram

AI-generated content may be incorrect.

## Wireframe

\*\*\* ACME Anvils Corporation \*\*\*

Supporting the animation industry for 50 years and counting!

SCRIPT: Hi, I'm <your name here>. How many anvils would you like to order today?

Number of anvils: **10**

SCRIPT: I can certainly help you with that. Could you please give me your name and address?

First and last name: **Wile E. Coyote**

Street address: **25 S. Main St.**

City: **Sedona**

State (2-letters): **AZ**

Zip code: **83633**

Press any key to display invoice. . .

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\* ACME Anvils Corporation \*\*\*

Customer Invoice

SHIP TO:

Wile E. Coyote

25 S. Main St.

Sedona

AZ

83633

Quantity ordered: 10

Cost per anvil: $88.50

Subtotal: $885.00

Sales Tax: $84.08

\_\_\_\_\_\_\_\_\_\_

TOTAL: $969.08

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

SCRIPT: Your total today is $969.08. Thanks for shopping with Acme!

And don't forget: Acme anvils fly farther, drop faster, and land harder than any other anvil on the market!

Press any key to end program...