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**Programming Fundamentals  
Project**

**UtilityBot  
A Modular Chat-Based Multi-Tool Program**

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**1. Program Overview**

UtilityBot is an extensible console application that integrates practical tools through a conversational interface. Designed for easy feature expansion, it currently offers core utilities accessible via text/numeric commands.

**2. Feature Categories**

**2.1 Calculator System**

*Mathematical & Analytical Tools*

* **Basic Math**  
  Handles +, -, ×, ÷ operations with error checking
* **BMI Calculator**  
  Computes Body Mass Index with WHO health categories
* **Age Calculator**  
  Determines exact age using system date
* **Tip Calculator**  
  Calculates gratuity percentages
* **Factorial Generator**  
  Computes factorial values

**2.2 Unit Converter**

*Measurement Translation*

* **Currency Converter**  
  Supports 7 currencies with USD intermediary conversion
* **Temperature**  
  Accurate °C ↔ °F translations
* **Length**  
  Meters ↔ Feet conversions
* **Weight**  
  Kilogram ↔ Pound calculations

**2.3 Clock Suite**

*Time Management*

* **Live Time Display**  
  Shows current system time
* **Countdown Timer**  
  Customizable alert system
* **Stopwatch**  
  Lap tracking with start/stop control

**2.4 Password Manager**

*Security Tools*

* **Generator**  
  Creates secure random passwords (8-50 chars)
* **Strength Checker**  
  Evaluates security on 5 criteria

**2.5 Random Generator**

*Probability Systems*

* **Number Generator**  
  Custom range outputs
* **Coin Flip**  
  Simulates heads/tails
* **Dice Roll**  
  Digital 6-sided die

**2.6 Game Collection**

*Entertainment Modules*

* **Number Guesser**  
  1-100 guessing with attempt counter
* **Tic-Tac-Toe**  
  AI opponent with win detection

**2.7 Task Organizer**

*Productivity Tool*

* **Add Tasks**  
  Simple text entry
* **List Manager**  
  Numbered task display
* **Remove Function**  
  Position-based deletion

**3. Core Interaction Elements**

**3.1 Greeting System**

* Random welcome messages from 5+ options
* Initial command suggestions

**3.2 Exit Protocol**

* Farewell message randomization
* Clean session termination

**4. Technical Implementation**

**4.1 Input Handling**

* Case-insensitive commands
* Dual recognition (text/numeric)

**4.2 Randomization**

* Time-based seed initialization
* Fair message selection algorithm

**4.3 Session Flow**

Greeting → Command Loop → Feature Execution → Exit

**5. Expansion Framework**

UtilityBot's modular design allows effortless feature additions:

|  |  |
| --- | --- |
| Existing Feature | Expansion Opportunities |
| Calculator | Add calorie/loan calculators |
| Converter | Support volume/energy units |
| Games | Include puzzles/trivia |
| Tasks | Add priority levels/due dates |