## **1. Effort / Cost Estimation**

### **1.1 Function Point Analysis**

#### **1.1.1 Identify System Functions**

**The following table summarizes the system’s functional modules, their corresponding FP types, complexity levels, and assigned weights (based on Albrecht's complexity multipliers):**

|  |  |  |  |
| --- | --- | --- | --- |
| **Functional Module** | **FP Type** | **Complexity** | **Weight** |
| User Registration / Login | EI | Low | 3 |
| Flight Search | EQ | Medium | 4 |
| Flight Info Display | EO | Medium | 5 |
| Seat Selection | EQ | Medium | 4 |
| Ticket Info Input | EI | Medium | 4 |
| Ticket Confirmation / Payment | EO | Medium | 5 |
| Order History Viewing | EQ | Medium | 4 |
| Admin Flight Data Management | EI | High | 6 |
| Flight Database | ILF | High | 15 |
| User Data | ILF | Medium | 10 |

**Total Unadjusted Function Point (UFP) = 3 + 4 + 5 + 4 + 4 + 5 + 4 + 6 + 15 + 10 = 60**

#### **1.1.2 General System Characteristics (GSCs)**

**We evaluated the 14 General System Characteristics (GSCs) to calculate the Value Adjustment Factor (VAF). The total Degree of Influence (TDI) was determined to be 43, based on the following criteria:**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **GSC Name** | **Score** | **Justification** |
| **1** | **Data Communications** | **3** | **Requires online interaction with flight APIs and payment systems.** |
| **2** | **Distributed Data Processing** | **1** | **System is mainly web-based with limited distributed logic.** |
| **3** | **Performance** | **4** | **High-performance expected during peak booking hours.** |
| **4** | **Heavily Used Configuration** | **2** | **System supports multiple users simultaneously but under moderate load.** |
| **5** | **Transaction Rate** | **3** | **Transactions are moderately frequent.** |
| **6** | **Online Data Entry** | **4** | **Users input booking and payment data online.** |
| **7** | **End-user Efficiency** | **3** | **Designed with usability in mind.** |
| **8** | **Online Update** | **4** | **Supports real-time seat selection and updates.** |
| **9** | **Complex Processing** | **3** | **Involves data validation, rule checks, and payment confirmation.** |
| **10** | **Reusability** | **2** | **Backend services may be reused in other modules.** |
| **11** | **Installation Ease** | **2** | **Relatively easy to deploy.** |
| **12** | **Operational Ease** | **3** | **Basic logging and error handling present.** |
| **13** | **Multiple Sites** | **2** | **System accessed by users from multiple locations.** |
| **14** | **Facilitate Change** | **3** | **Modular architecture allows for future enhancements.** |

**Total Degree of Influence (TDI) = 43**

**Value Adjustment Factor (VAF) is calculated as:**

**VAF=0.65+(0.01×TDI)=0.65+0.43=1.08**

**1.1.3 Final FP Count**

**Final Function Point=UFP×VAF=60×1.08=64.8 ≈ 65**

### **1.2 COCOMO Analysis**

**To further estimate the development effort, we apply the COCOMO II model using the Function Point–derived size. The adjusted final Function Point is 65, which we convert to estimated Lines of Code (LOC) using a general industry average of 80 LOC per FP:**

**Estimated LOC = 65 × 80 = 5,200 LOC → 5.2 KLOC**

**Since our project is an organic system (developed by a small team in a familiar in-house environment), we use the constants:**

* **A = 2.94**
* **B = 0.91**

#### **Scale Factor Calculation:**

**We assign the following ratings based on the system characteristics:**

|  |  |  |
| --- | --- | --- |
| **Factor** | **Value** | **Reason** |
| **PREC** | 3.72 (Nominal) | Similar past systems |
| **FLEX** | 3.04 (Nominal) | Some flexibility allowed |
| **RESL** | 2.83 (High) | Risks partially resolved |
| **TEAM** | 2.19 (High) | Tightly coordinated team |
| **PMAT** | 4.68 (Nominal) | Standard processes applied |

**sf = 0.91 + 0.01 × (3.72 + 3.04 + 2.83 + 2.19 + 4.68) = 0.91 + 0.1646 = 1.0746**

#### **Effort Calculation:**

**We use the COCOMO II formula:**

**Effort = A × (Size)^sf = 2.94 × (5.2)^1.0746 ≈ 8.23 person-months**

### **Cost Estimation and Comparison:**

**Assuming an average cost of AUD 10,000 per person-month, the development cost based on COCOMO would be:**

**8.23 × 10,000 = AUD 82,300**

**This estimate fits reasonably within the broader AUD 125,000 total project cost discussed in the cost-benefit analysis. That analysis includes additional long-term costs such as staff training, maintenance, and system support.**

**This consistency between technical estimation and financial planning reinforces the feasibility and justification of the project.**