**Test Plan for Aircraft Inventory System**

**Functional Testing**

1. **Validate Garage Data Retrieval**
   * **Description:** The system returns correct data for a given garage ID.
   * **Endpoint:** GET garages/{id}
2. **Validate Aircraft Status Retrieval**
   * **Description:** The system returns an up-to-date status for the aircraft in each garage.
   * **Endpoint:** GET garages/{id}/aircrafts/
3. **Validate Specific Aircraft Retrieval**
   * **Description:** The system returns a valid status code when provided with a valid garage ID and a valid aircraft ID.
   * **Endpoint:** GET garages/{id}/aircrafts/{id}
4. **Validate Missile Count Retrieval**
   * **Description:** The system returns a valid status code when provided with a valid garage ID, a valid aircraft ID, and the current missile count.
   * **Endpoint:** GET garages/{id}/aircrafts/{id}/missiles/
5. **Validate Aircraft Addition**
   * **Description:** The system successfully adds an aircraft to a garage when provided with valid data (e.g., aircraftType: “F16”, missilesIds: [435,122,78]).
   * **Endpoint:** POST garages/{id}/aircrafts/

**Boundary Testing**

* **Test Garage Capacity Limits**
  + **Description:** Verify the behavior when all 5 garages reach their maximum capacity (10 aircraft per garage) and when the missile count in a garage reaches the limit (100 missiles). Confirm that the system prevents adding more aircraft or missiles beyond these limits.

**Negative Testing**

1. **Non-Existent Garage ID**
   * **Description:** The system returns an error when an invalid (non-existent) garage ID is provided.
   * **Endpoint:** GET garages/{id}
2. **Non-Existent Garage for Aircraft Status**
   * **Description:** The system returns an error when trying to retrieve aircraft status for a non-existent garage.
   * **Endpoint:** GET garages/{id}/aircrafts/
3. **Invalid Garage and Aircraft IDs**
   * **Description:** The system returns a 404-status code when provided with an invalid garage ID along with an invalid aircraft ID.
   * **Endpoint:** GET garages/{id}/aircrafts/{id}
4. **Invalid Garage with Valid Aircraft ID for Missile Retrieval**
   * **Description:** The system returns a 404-status code when provided with an invalid garage ID along with a valid aircraft ID.
   * **Endpoint:** GET garages/{id}/aircrafts/{id}/missiles/
5. **Valid Garage with Invalid Aircraft ID**
   * **Description:** The system returns a 404-status code when a valid garage ID is provided with an invalid aircraft ID.
   * **Endpoint:** GET garages/{id}/aircrafts/{id}/missiles/
6. **Invalid Data for Aircraft Addition**
   * **Description:** The system returns an error when an aircraft addition request is sent with invalid data (e.g., unsupported aircraft type or incorrectly formatted missilesIds).
   * **Endpoint:** POST garages/{id}/aircrafts/

**Integration Testing**

* **Data Consistency Across Endpoints**
  + **Description:** Verify that after adding an aircraft (via POST), subsequent GET requests (for the garage, its aircraft, and missile details) correctly reflect the updated data.

**Performance Testing**

* **Response Time and Load Testing**
  + **Description:** Evaluate the response times of the GET requests under various load conditions and ensure that the system can handle a high volume of requests, especially as it approaches boundary conditions.

**Critical Tests (Limited Time)**

*For production deployment under time constraints, the following tests are considered critical:*

* **Validate Garage Data Retrieval**
  + Ensures the system returns correct data for a given garage ID.
* **Validate Aircraft Status Retrieval**
  + Confirms that the system returns an up-to-date status for the aircraft in each garage.
* **Validate Aircraft Addition**
  + Verifies that an aircraft can be successfully added to a garage with valid data. This is essential for ensuring that core functionality works.
* **Test Garage Capacity Limits**
  + Ensures that the system correctly handles capacity constraints by preventing the addition of aircraft or missiles when limits are reached.