

Class Test Plan

3.1 FileManager Class Test Scenarios

Test Scenario	Category	Input	Expected Output	Actual Output	Status
Load existing valid JSON file	Normal	File with [{"student_id": "S001"}]	Returns list with 1 student	Returns list with 1 student	Pass
Load empty JSON file	Edge	File contains []	Returns empty list []	Returns empty list []	Pass
Create missing file on initialization	Edge	File doesn't exist	File created with [] content	Dedicated Json files are already built in	Fail/Pass
Handle corrupted JSON file	Invalid	File contains {invalid json}	Raises FileCorruptionError or	Raises FileCorruptionError	Pass

3.2 RoleConfig Class Test Scenarios

Test Scenario	Category	Input	Expected Output	Actual Output	Status
Initialize with valid domains	Normal	student_domains=("alustudent.com",)	Domains stored correctly	Domains stored correctly	Pass
Handle multiple domains per role	Edge	student_domains=("a.com", "b.com")	Both domains accepted	Both domains accepted	Pass
Initialize with empty domain tuple	Edge	student_domains=()	Empty tuple accepted		

Work with default domains	Normal	No parameters provided	Default domains set		
Store custom staff domains	Normal	staff_domains=("alueducation.com",)	Staff domains stored correctly		

3.3 SystemManager Class Test Scenarios

Role Detection

Test Scenario	Category	Input	Expected Output	Actual Output	Status
Determine student role from valid email	Normal	"alice@alustudent.com"	Returns "student"	Returns "student"	Pass
Determine staff role from valid email	Normal	"john@alueducation.com"	Returns "staff"	Returns "staff"	Pass
Handle email with mixed case	Edge	"Alice@ALUSTUDENT.com"	Returns "student" (case-insensitive)	Returns "student" (case-insensitive)	Pass
Reject email without @ symbol	Invalid	"alicealustudent.com"	Raises ValidationError	Raises ValidationError	Pass
Reject unrecognized email domain	Invalid	"alice@gmail.com"	Raises ValidationError	Raises ValidationError	Pass

Resource Management

Test Scenario	Category	Input	Expected Output	Actual Output	Status
Add valid resource	Normal	"L001", "Laptop", "IT", 5	Resource added successfully	Resource added successfully	Pass

Prevent duplicate resource ID	Invalid	Add "L001" twice	Raises ConflictError on second add	Raises ConflictError on second add	Pass
Update resource quantity	Normal	"L001", new quantity 10	Quantity updated to 10	Quantity updated to 10	Pass
Remove resource not currently borrowed	Normal	"L001" with no active borrowings	Resource removed successfully	Resource removed successfully	Pass
Prevent removing borrowed resource	Invalid	"L001" currently borrowed	Raises ConflictError	Raises ConflictError	Pass

Borrowing method

Test Scenario	Category	Input	Expected Output	Actual Output	Status
Borrow available resource	Normal	Student "S001", Resource "L001" (qty=5)	Transaction created, qty becomes 4	Transaction created, qty becomes 4	Pass
Calculate due date correctly	Normal	Borrow on "2025-01-01"	Due date is "2025-01-04" (3 days)	Due date is "2025-01-04" (3 days)	Pass
Prevent borrowing unavailable resource	Invalid	Resource with qty=0	Raises ConflictError	Raises ConflictError	Pass
Prevent double borrowing same resource	Invalid	Student borrows L001 twice	Raises ConflictError on second attempt	Raises ConflictError on second attempt	Pass

Return method

Test Scenario	Category	Input	Expected Output	Actual Output	Status
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Return borrowed resource	Normal	Valid transaction ID	Status="returned", qty increased by 1	Status="returned", qty increased by 1	Pass
Prevent returning already returned item	Invalid	Transaction already returned	Raises ConflictError	Raises Conflict Error	Pass
Return by student + resource ID	Normal	Student "S001", Resource "L001"	Finds active transaction, returns it	Finds active transaction, returns it	Pass

3.4 staff_menu function Test Scenarios

Test Scenario	Category	Input/Action	Expected Output	Actual Output	Status
Display menu options correctly	Normal	Staff logs in	Shows 6 menu options (add, update, remove, view, etc.)	Shows 6 menu options (add, update, remove, view, etc.)	Pass
Add resource through menu	Normal	Choose option 1, enter valid data	Resource added, confirmation shown	Resource added, confirmation shown	Pass
Update resource quantity	Normal	Choose option 2, enter resource ID and new qty	Quantity updated successfully	Quantity updated successfully	Pass
View all resources in table format	Normal	Choose option 4	Resources displayed in tabulated format	Resources displayed in tabulated format	Pass
View overdue transactions	Normal	Choose option 6	Overdue items displayed (if any)	Overdue items displayed (if any)	Pass
Handle invalid menu choice	Invalid	Enter option 99	Shows "Invalid choice" message	Shows "Invalid choice" message	Pass

Gracefully handle errors	Edge	Try to remove non-existent resource	Shows error message, returns to menu	Shows error message, returns to menu	Pass
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3.5 student_menu function Test Scenarios

Test Scenario	Category	Input/Action	Expected Output	Actual Output	Status
New student registration	Normal	First-time email, provide name	Account created with student ID	Account created with student ID	Pass
Returning student login	Normal	Existing email	Recognizes student, shows "Welcome back"	Recognizes student, shows "Welcome back"	Pass
View available resources	Normal	Choose option 1	Shows resources with qty > 0 in table	Shows resources with qty > 0 in table	Pass
Borrow available resource	Normal	Choose option 2, enter "L001"	Borrowing succeeds, transaction created	Borrowing succeeds, transaction created	Pass
Return borrowed resource	Normal	Choose option 3, select resource	Return succeeds, qty restored	Return succeeds, qty restored	Pass
View borrowing history	Normal	Choose option 4	Shows active and past transactions	Shows active and past transactions	Pass
Handle borrowing unavailable resource	Invalid	Try to borrow resource with qty=0	Shows error, no transaction created	Shows error, no transaction created	Pass
Prevent returning non-borrowed item	Invalid	Try to return resource not borrowed	Shows "No active transaction" error	Shows "No active transaction" error	Pass

