FULL Photo Album test specification

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| Atom | Scope |
| Photo | 5 |
| Name | 4 |
| Password | 4 |
| User | 4 |
| Group | 4 |

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| --- | --- | --- | --- |
| Subset | Atom | Extension mode | Cardinality |
| OWNER | User | exclusive | one |
| OWNER\_GROUP | Group | exclusive | one |
| OWNER\_GROUP\_NAME | Name | exclusive | one |
| ONWER\_PASSWD | Password | exclusive | one |
| OWNER\_NAME | Name | exclusive | one |

|  |  |
| --- | --- |
| State variable | Type |
| photoAt | seq Photo |
| ownerName | Name |
| loggedIn | set Name |
| groups | Name -> Group |
| users | Name -> User |
| members | Group -> User |
| passwords | User -> Password |
| groupPhotos | Photo -> Group |

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| --- | --- |
| Invariant | Name |
| #photoAt.elems = #photoAt | Disjoint |
| #photoAt <= 3 | Bounded Size |
| lone loggedIn | At most one user logged in |
| members in ran[groups] -> ran[users] | members can only involve users and groups in the system |
| passwords in ran[users] -> one Password | users must have exactly one password |
| groupPhotos in Photo -> ran[groups] | group photos are valid |

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| --- | --- |
| Operation |  |
| init |  |
|  | true |
| photoAt | none -> none |
| ownerName | none |
| lggedIn | none |
| passwords | OWNER -> OWNER \_PASSWD |
| users | OWNER\_NAME -> OWNER |
| groups | OWNER\_GROUP\_NAME -> OWNER\_GROUP |
| members | OWNER\_GROUP -> OWNER |

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| --- | --- | --- | --- | --- |
| Operation |  |  |  |  |
| addPhoto |  |  |  |  |
| p:Photo, owner\_group:Group,  report!:Int | ownerName in loggedIn | | | ownerName !in loggedIn |
| #photoAt < 3 | | #photoAt >= 3 | true |
| p !in ran[photoAt] | p in ran[photoAt] | true | true |
| photoAt | photoAt.add[p] | = | = | = |
| groupPhotos | groupPhotos + p -> owner\_group | = | = | = |
| report! | 1 | -1 | -2 | -3 |

|  |  |  |
| --- | --- | --- |
| Operation |  |  |
| viewPhotos |  |  |
| result!:set Photo, report!:Int | one loggedIn | no loggedIn |
| result! | photoAt.elems | = |
| report! | 1 | -3 |