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| **Name:** | Create Movie |
| **Description:** | Create a new movie and add detail data.The user must give a title. The title does not have to be unique.The user must confirm the change.The user can trigger the functions save and undo whenever there are unsaved changes. |
| **Preconditions:** | None |
| **Input:** | W0.1 Movie MasterView, Movie Detail Dat |
| **Postconditions:** | The new movie is stored |
| **Output:** | W0.1 Movie MasterView, movies list is updated with new entry at the corresponding position according to the currently active sorting criterion. |
| **Exception:** | (E1) user does not confirm the action |
| **Rules:** | (R1) A movie must have a title |

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| **Name:** | Filter and Sort Movies |
| **Description:** | Filter movies and sort it according to a sorting criterium and a sorting direction. All movies matching the filter string are shown sorted according to the sorting criterion and in the sorting direction.  When no filter string is given, all movies are sorted. |
| **Preconditions:** | None |
| **Input:** | W0.1: Movie MasterView, filter string, sorting criterion, sorting direction |
| **Postconditions:** | Nothing changed |
| **Output:** | W0.1: Movie MasterView, list of movies which match the fitler string sorted according to the sorting criterion and sorting direction |
| **Exception:** | None |
| **Rules:** | (R1) The sorting criteria and sorting directions are:  - title (descending/ascending)  - rating (descending/ascending)  - overall rating (descending/ascending)  (R2) a movie matches the filter string when its title contains the string |

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| **Name:** | Start Movie Manager |
| **Description:** | Initialize and start the application by loading all the data from the persistent storage. All movies are shown as a list. |
| **Preconditions:** | None |
| **Input:** | User event to start the movie manager application; existing movies and performers data from storage |
| **Postconditions:** | Persistent data from storage is loaded |
| **Output:** | W0.1 Movie MasterView with all existing movies sorted by title ascending |
| **Exception:** | (E1) no connection to the persistent storage |
| **Rules:** |  |

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| **Name:** | List Movies |
| **Description:** | Show all movies in a list together with their title, overall rating and image. If there does not exist a movie, an empty list is shown.  This function is triggered by the start of the app and when selected by the user |
| **Preconditions:** | None |
| **Input:** | W0.1: Movie MasterView OR W1.1: Performer MasterView OR 2.1 Search MasterView |
| **Postconditions:** | Nothing changed |
| **Output:** | W0.1: Movie MasterView show all movies with title, overall rating and image, the list is sorted by title ascending. |
| **Exception:** | None |
| **Rules:** |  |

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| **Name:** | Change Movie Detail Data |
| **Description:** | Change the data of an existing movie. It is possible to change the following data: the strings 'title', 'description', the integer 'runtime', the lists  'languages', 'releases', 'filmingLocations', 'countriesOfOrigin' and the image. The user has to confirm the changes.The user can trigger the functions save and undo within this function whenever there are unsaved changes. |
| **Preconditions:** | Movie exists |
| **Input:** | W0.2: Movie DetailView, new dat |
| **Postconditions:** | Movie is updated with the new data |
| **Output:** | W0.2: Movie DetailView, Movie is updated with the new data |
| **Exception:** | (E1) user does not confirm the action |
| **Rules:** |  |

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| **Name:** | Show Movie Details |
| **Description:** | Show movie details of an existing movie. |
| **Preconditions:** | Movie exists |
| **Input:** | W0.1: Movie MasterView OR W1.2 Performer DetailView OR W2.1 Search MasterView, Movie |
| **Postconditions:** | Nothing changed |
| **Output:** | W0.2: Movie DetailView |
| **Exception:** | none |
| **Rules:** |  |

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| **Name:** | Unlink Performer |
| **Description:** | Remove the link between a performer and a movie. If the performer is not linked to any other movie, the user is warned that the performer will be removed. If the user confirms, the performer is removed. When a performer is unlinked from a movie, the overall rating of the movie is recalculated.  The user must confirm the change.  The user can trigger the functions save and undo within this function whenever there are unsaved changes |
| **Preconditions:** | Performer exists and is linked to a movie |
| **Input:** | W0.2 Movie DetailView, Performer |
| **Postconditions:** | W0.2 Movie DetailView, Performer |
| **Output:** | W0.2: Movie DetailView, Linked Performers list of the movie does no longer contain the performer |
| **Exception:** | (E1) the user does not confirm the change |
| **Rules:** | (R1) performer must be linked with a movie |

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| **Name:** | Rate Movie |
| **Description:** | Set the rating of a movie. Then the overall rating of the movie is re-calculated.The user has to confirm the change. The user can trigger the functions save and undo within this function whenever there are unsaved change |
| **Preconditions:** | Movie exists |
| **Input:** | W0.2: Movie DetailView, Movie rating value |
| **Postconditions:** | Movie is updated with the rating value and overall rating value |
| **Output:** | W0.2: Movie DetailView, movie updated with the rating value and updated overall rating |
| **Exception:** | (E1) the user does not confirm the change |
| **Rules:** | (R1) The movie can be rated from 0 to 5 stars in 0.5 star steps.  (R2) If the movie is not rated, it is marked as not rated (grey stars, black stars = 0 rated) |

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| **Name:** | Filter and Sort Performers |
| **Description:** | Filter performers according to a filter string and sort it according to a sorting criterion and a sorting direction. All performers matching the filter string are shown sorted according to the sorting criterion and in the sorting direction.  When no filter string is given, all performers are sorted |
| **Preconditions:** | None |
| **Input:** |  |
| **Postconditions:** | Nothing changed |
| **Output:** | W1.1: Performer MasterView, list of performers matching the filter string and sorted according to the sorting criterion and sorting direction |
| **Exception:** | none |
| **Rules:** |  |

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| **Name:** | Undo Movie Changes |
| **Description:** | Undo the unsaved changes. The user can undo all unsaved changes step by step in reverse order. Thus, the last unsaved change is undone first. |
| **Preconditions:** | Movie exists and has unsaved changes |
| **Input:** | W0.2: Movie DetailView, unsaved changes |
| **Postconditions:** | At least one unsaved change is undone |
| **Output:** | W0.2: Movie DetailView, Movie shows the values before the unsaved changes |
| **Exception:** |  |
| **Rules:** | (R1) Unsaved changes are undone in reverse order. The last unsaved change is undone first. |

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| **Name:** | Rate Performer |
| **Description:** | Set the rating of a performer. The overall rating for all linked movies is re-calculated.The user has to confirm the change. The user can trigger the functions save and undo within this function whenever there are unsaved changes |
| **Preconditions:** | Performer exists |
| **Input:** | W1.2: Performer DetailView, Performer rating value |
| **Postconditions:** | Performer is updated with the rating value and the overall rating of all linked movies is updated |
| **Output:** | W1.2: Performer DetailView shows performer updated with new rating |
| **Exception:** | (E1) the user does not confirm the change |
| **Rules:** | (R1) The performer can be rated from 0 to 5 stars in 0.5 star steps.  (R2) If the performer is not rated, it is marked as not rated. (grey stars, black stars = 0 rated) |

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| **Name:** | Stop Movie Manager |
| **Description:** | Stop the movie manager application. If changes are unsaved, they are dropped. |
| **Preconditions:** | None |
| **Input:** | User input to stop the application |
| **Postconditions:** | All unsaved changes are dropped, application is inactive |
| **Output:** | The application UI is closed. |
| **Exception:** | None |
| **Rules:** | None |

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| **Name:** | Link Existing Movie |
| **Description:** | Link an existing movie to the performer. The user is shown the list of existing movies not yet linked to the performer. The user can select one or cancel the linking. If a movie is linked to the performer, the overall rating of the movie is recalculated. The user has to confirm the change. The user can trigger the functions save and undo within this function whenever there are unsaved changes |
| **Preconditions:** | Performer and Movie exist which are not yet linked |
| **Input:** | W1.2: Performer DetailView |
| **Postconditions:** | Performer and selected existing movie are linked.  The overall rating of the movie is recalculated |
| **Output:** | W1.2: Performer DetailView, Linked Movie list of the performer includes the movie |
| **Exception:** | (E1) the user does not confirm the change; (E2) the user cancels the linking |
| **Rules:** |  |

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| **Name:** | List Performers |
| **Description:** | Show all existing performers in a list. If there does not exist a performer, an empty list is shown. |
| **Preconditions:** | None |
| **Input:** | W01. Movie Masterview OR W1.1: Performer MasterView OR W2.1 Search MasterView |
| **Postconditions:** | Nothing Changed |
| **Output:** | W1.1: Performer MasterView shows all performers with name, rating and image, the list is sorted by name ascending. |
| **Exception:** | none |
| **Rules:** |  |

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| **Name:** | Undo Performer Changes |
| **Description:** | Undo the unsaved changes. The user can undo all unsaved changes step by step in reverse order. Thus, the last unsaved change is undone first. |
| **Preconditions:** | Performer exists and has unsaved changes |
| **Input:** | W1.2: Performer DetailView, unsaved changes |
| **Postconditions:** | At least one unsaved change is undone |
| **Output:** | W1.2: Performer DetailView, Performer shows the values before the unsaved change |
| **Exception:** |  |
| **Rules:** | (R1) Unsaved changes are undone in reverse order. The last unsaved change is undone first. |

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| **Name:** | Show Performer Details |
| **Description:** | Show performer details of a selected performer. |
| **Preconditions:** | Performer exists |
| **Input:** | W1.1: Performer MasterView OR W0.2 Movie DetailView OR W2.1 Search MasterView, Performer |
| **Postconditions:** | Nothing changed |
| **Output:** | W1.2: Performer DetailView |
| **Exception:** | none |
| **Rules:** |  |

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| **Name:** | Calculate Overall Rating |
| **Description:** | Calculate the overall rating of a movie based on the movies rating and on the ratings of the performers linked to the movie.  This function is triggered as soon as a rating of a movie or performer is changed or a a link between a performer and a movie is added or removed |
| **Preconditions:** | Movie exists |
| **Input:** | None |
| **Postconditions:** | Movie data is updated with the overall rating of the movie. |
| **Output:** | None |
| **Exception:** | None |
| **Rules:** | (R1) If the movie is not rated, then overall rating = not rated  (R2) If the movie is rated and there exists a rated performer linked with the movie, the overall rating is calculated by the following formula:  overall rating = 1/2 \* (average performer rating + movie rating)  and the average Performer rating is calculated as:  average Performer rating = sum of linked performer ratings for performers /number of linked performers  (R3) If the movie is rated and there does not exist a rated linked performer, then overall rating = movie rating.  (R4) The overall rating is always shown with the exact value in the format x.y and the corresponding star rating  (R5) Rating numbers are mapped to the nearest star value as follows:  \* x.8, x.9 are mapped to x+1 stars  \* x.3, x.4, x.5, x.6, x.7 are mapped to x.5 stars  \* x.1, x.2 are mapped to x stars  (R6) not rated is shown as grey stars and 0 rated is shown as black stars. Rating > 0 is shown as yellow stars |

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| **Name:** | Link new performer |
| **Description:** | Create a performer and link it to an existing movie. The user can edit and change the performer details before confirming the change. The overall rating of the movie is recalculated.  The user can trigger the functions save and undo within this function whenever there are unsaved changes. |
| **Preconditions:** | Movie exists |
| **Input:** | W0.2 Movie DetailView, new performer data |
| **Postconditions:** | The performer exists and is linked with the movie. The overall rating of the linked movie is recalculated. |
| **Output:** | W0.2 Movie DetailView, shows the new performer in the linked performers list |
| **Exception:** | (E1) the user does not confirm the change (E2) The user cancels the performer creation |
| **Rules:** |  |

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| **Name:** | Create Performer |
| **Description:** | Create a new performer and link it to a movie.  The user is prompted to link a movie. The user can select an existing one or create a new one or cancel the linking.  The user can edit the detail data of the performer. If the performer has a rating, the overall rating of all linked movies is recalculated.  The user has to link a movie, give a name and to confirm the changes.  The user can trigger the functions save and undo whenever there are unsaved changes. |
| **Preconditions:** | None |
| **Input:** | W1.1: Performer MasterView, Performer data |
| **Postconditions:** | Movie and a new created performer are linked. The performer data is updated with the new data. The overall rating of the linked movie is recalculated. The new performer is stored. |
| **Output:** | W1.1: Performer MasterView, performers list is updated with new entry at the corresponding position according to the currently active sorting criterion. |
| **Exception:** | (E1) the user does not confirm the change; (E2) the user does not link the performer to a movie |
| **Rules:** | (R1) A performer always has to be linked to a movie  (R2) A performer must have a name |

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| **Name:** | Save Performer Changes |
| **Description:** | Save all unsaved changes of a performer. |
| **Preconditions:** | Performer exists and has unsaved changes. |
| **Input:** | W1.2: Performer DetailView, unsaved changes |
| **Postconditions:** | No unsaved changes exist. Performer is updated. |
| **Output:** | W1.2: Performer DetailView, Performer shows updates |
| **Exception:** | none |
| **Rules:** | (R1) after a save the edit mode is left and the view before the switch to the edit mode is shown |

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| **Name:** | Remove Movie |
| **Description:** | Remove an existing movie. This includes the removal of all links to performers from this movie. If the removal of the movie results in any performers not linked with a movie anymore, the user is warned. If the user accepts, the movie and the performers linked only to it are removed.  The user can undo the change |
| **Preconditions:** | At least one movie exists |
| **Input:** | W0.1 Movie MasterView, Movie |
| **Postconditions:** | The movie is removed as well as all performers only linked to Movie. The movie is unlinked from all other performers. |
| **Output:** | W0.1 Movie MasterView, movie list without the movie |
| **Exception:** | (E1) the user cancels the action; (E2) the user undoes the change |
| **Rules:** |  |

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| **Name:** | Watch Movie |
| **Description:** | Set the watch date of a movie. If a watch date already was set, it is overwritten.  The user has to confirm the change  The user can trigger the functions save and undo within this function whenever there are unsaved changes |
| **Preconditions:** | Movie exists |
| **Input:** | W0.2 Movie DetailView, Watch Date |
| **Postconditions:** | Movie is updated as watched and the watch date is set to Watch Date |
| **Output:** | W0.2 Movie DetailView, movie with Watch Date as watch date |
| **Exception:** | (E1) the user does not confirm the change, (E2) the user cancels the action |
| **Rules:** | (R1) The watch date cannot be in the future |

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| **Name:** | Link Existing Performer |
| **Description:** | Link an existing performer to the movie. The user is shown the list of existing performers not yet linked to the movie and can select one of them or cancel the linking. When a new performer is linked to a movie, the overall rating of the movie is recalculated.  The user has to confirm the changes.  The user can trigger the functions save and undo within this function whenever there are unsaved changes. |
| **Preconditions:** | Movie and Performer exist |
| **Input:** | W0.2: Movie DetailView |
| **Postconditions:** | Movie and selected existing performer are linked.  The overall rating of the movie is recalculated. |
| **Output:** | W0.2: Movie DetailView, Linked Performer list of the movie includes the performer |
| **Exception:** | (E1) the user does not confirm the change; (E2) the user cancels the linking |
| **Rules:** |  |

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| **Name:** | Remove Performer |
| **Description:** | Removes an existing Performer |
| **Preconditions:** | Performer exists. |
| **Input:** | W1.1: Performer MasterView, Performer |
| **Postconditions:** | Performer is deleted. |
| **Output:** |  |
| **Exception:** |  |
| **Rules:** |  |

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| **Name:** | Change Performer Detail Data |
| **Description:** | Change the data of an existing performer. It is possible to change the following data:  the strings 'name', 'biography' and 'birthName' the date 'dateOfBirth', the list 'occupations' and the image. The user has to confirm the changes  The user can trigger the functions save and undo within this function whenever there are unsaved changes. |
| **Preconditions:** | Performer exists |
| **Input:** | W1.2: Performer DetailView, new data |
| **Postconditions:** | Performer is updated according to the new data |
| **Output:** | W1.2: Performer DetailView, Performer is updated with the new data |
| **Exception:** | (E1) user does not confirm the action |
| **Rules:** |  |

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| **Name:** | Unlink Movie |
| **Description:** | Remove the link between a performer and a movie. If the performer is not linked to any other movie, the user is warned. If the user confirms, the performer is removed from the storage. When a movie is unlinked from a performer, the overall rating of the movie is recalculated.  The user has to confirm the change.  The user can trigger the functions save and undo within this function whenever there are unsaved changes |
| **Preconditions:** |  |
| **Input:** | W1.2: Performer DetailView, Movie |
| **Postconditions:** | Performer is updated according to the new data |
| **Output:** | W1.2: Performer DetailView, Linked Movies list of the performer does no longer contain the movie |
| **Exception:** |  |
| **Rules:** | (R1) A performer has to be linked to at least one movie. |

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| **Name:** | Search |
| **Description:** | Search for movies by title and for performers by name. The titles and images of the resulting movies and the names and images of the resulting performers are shown. The user can select where to search. If no search text is given, no results are shown. |
| **Preconditions:** |  |
| **Input:** | W2.1: Search MasterView, search string |
| **Postconditions:** |  |
| **Output:** | W2.1: Search MasterView, movie and/or performer results sorted from closest to farthest. MOvies with title and image. Performers with name and image |
| **Exception:** |  |
| **Rules:** | (R1) The distance is computed via the normalized minimum edit distance algorithm.  (R2) Items are results when they are conforming to the following threshold distances:  0.0 for a search string length of 0,  0.02 for a length of 1,  0.03 for a length of 2,  0.05 length 3,  0.1 length 4,  0.25 length 5,  0.4 length 6,  0.5 length 7,  0.55 length 8,  0.65 length 9,  0.7 length 10 and beyond.  (R3) When returning to the search view from a result, the results of the previous search are shown. Changes to performers or movies are represented in the search results.  (R4) The search modes and corresponding outputs are:  - performers and movies => list of 5 closest movies and 5 closest performers and possibility to search in movies or performers. The category with the closest candidate is displayed first  - only movies => list of result movies sorted  - only performers => list of result performers sorted |

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| **Name:** | Link New Movie |
| **Description:** | Create a movie and link it to the performer. The user can edit and change the movie details before confirming the change. The overall rating of the new movie is calculated.  The user can trigger the functions save and undo within this function whenever there are unsaved changes. |
| **Preconditions:** | Performer exists |
| **Input:** | W1.2: Performer DetailView, new movie data |
| **Postconditions:** | The movie exists and is linked to the performer. The overall rating of the movie is calculated. |
| **Output:** | W1.2: Performer DetailView, shows the new movie in the linked movies list |
| **Exception:** | (E1) the user does not confirm the change (E2) The user cancels the movie creation |
| **Rules:** |  |

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| **Name:** | Save Movie Changes |
| **Description:** | Save all unsaved changes of a movie. |
| **Preconditions:** | Movie exists and has unsaved changes. |
| **Input:** | W0.2: Movie DetailView, unsaved changes |
| **Postconditions:** | No unsaved changes exist. Movie is updated. |
| **Output:** | W0.2: Movie DetailView, Movie shows updated |
| **Exception:** |  |
| **Rules:** | (R1) after a save the edit mode is left and the view before the switch to edit mode is shown |