

CLAIMS

1. A method for managing workflows in a data processing system (104, 120), the data processing system (104, 120) comprising: (i) at least one data store storing: a plurality of data objects (142, 150, 152, 153, 154) and values of their attributes (707, 712, 811-817, 816a-c, 817a-c), the plurality of data objects (142, 150, 152, 153, 154) including a first data object, the first data object having a plurality of attributes (707, 712, 811-817, 816a-c, 817a-c) including a first attribute that can have any one of a plurality of values; and metadata specifying relationships among at least some of the plurality of data objects (142, 150, 152, 153, 154), wherein data objects (142, 150, 152, 153, 154) in the plurality of data objects (142, 150, 152, 153, 154) are organized into one or more hierarchies (150, 717, 718, 815a-c), and wherein the metadata (144) specifies at least one of the one or more hierarchies (150, 717, 718, 815a-c); and (ii) a workflow management system (102, 130) comprising: a workflow execution engine (133) for managing execution of finite state machines (300, 350, 400, 500, 550, 600, 650), FSMs, including a first FSM associated with the first data object and for managing a first workflow for the first data object, the method comprising:

when a current workflow state of the first FSM is a first workflow state, using the workflow management system (102, 130) to perform:

determining a current value of the first attribute of the first data object by accessing the current value of the first attribute in the at least one data store, wherein the current value of the first attribute indicates a first hierarchy, of the one or more hierarchies (150, 717, 718, 815a-c), to which the first data object belongs;

identifying, using the current value of the first attribute and the metadata specifying relationships among at least some of the plurality of data objects (142, 150, 152, 153, 154), a first actor authorized to perform a first workflow task for the first data object, wherein identifying the first actor comprises;

identifying the first actor as an actor (115, 139, 156, 158, 176, 382, 392, 704, 708, 713) authorized to perform the first workflow task for a second data object in the plurality of data objects (142, 150, 152, 153, 154), wherein the second data object is related to the first data object according to the first hierarchy;

generating a graphical user interface, GUI (380, 390, 510, 800, 810, 820, 825, 830, 835, 837, 840, 845, 850, 855, 860, 865, 870, 910, 920, 930, 940, 1000) through which the first actor (115, 139, 156, 158, 176, 382, 392, 704, 708, 713) can provide input that the first workflow task is to be performed; and

in response to receiving, from the first actor and through the GUI (380, 390, 510, 800, 810, 820, 825, 830, 835, 837, 840, 845, 850, 855, 860, 865, 870, 910, 920, 930, 940, 1000), input specifying that the first workflow task is to be performed:

performing the first workflow task for the first data object; and

updating the current workflow state of the first FSM to a second workflow state.

2. The method of claim 1, wherein the second data object is an ancestor of the first data object in the first hierarchy.
3. The method of claim 1 or 2, wherein the second data object is a parent of the first data object in the first hierarchy.
4. The method of claim 1, wherein the current value of the first attribute indicates at least one classification for the first data object.
5. The method of claim 1, further comprising:
 - accessing a first specification for the first FSM for managing the first workflow, the first specification indicating workflow states and transitions among states in the workflow states;
 - generating the first FSM for managing the first workflow for the first data object using the first specification; and
 - associating the first FSM with the first data object.
6. The method of claim 5, wherein the plurality of data objects (142, 150, 152, 153, 154) includes a second data object different from the first data object, the method further comprising:

generating, using the first specification, a second FSM for managing the first workflow for the second data object, wherein the first FSM is different from the second FSM; and

associating the second FSM with the second data object.

7. The method of claim 1, wherein the first data object comprises a second attribute, the method comprising:

generating a second FSM for managing a second workflow for changing a value of the second attribute of the first data object; and

concurrently with using the first FSM to manage the first workflow for the first data object, using the second FSM to manage the second workflow for the second attribute of the first data object.

8. The method of claim 1 or any other preceding claim, wherein the first workflow for the first data object is a workflow for managing changes to the first data object.

9. The method of claim 1 or any other preceding claim, further comprising:

when the first FSM indicates that the current workflow state of the first workflow for the first data object is the first workflow state,

receiving input from each of multiple actors, including the first actor, input indicating whether or not the first workflow task is to be performed; and

performing the first workflow task for the first data object only when a majority of the multiple actors provides input indicating that the first workflow task is to be performed.

10. At least one non-transitory computer readable storage medium storing processor-executable instructions that, when executed by a data processing system (104, 120), cause the data processing system (104, 120) to perform the method of any one of the preceding claims.

11. A data processing system (104, 120), comprising:

at least one computer hardware processor;

at least one data store storing: a plurality of data objects (142, 150, 152, 153, 154) and values of their attributes (707, 712, 811-817, 816a-c, 817a-c), the plurality of data objects (142, 150, 152, 153, 154) including a first data object, the first data object having a plurality of attributes (707, 712, 811-817, 816a-c, 817a-c) including a first attribute that can have any one of a plurality of values; and metadata specifying relationships among at least some of the plurality of data objects (142, 150, 152, 153, 154), wherein data objects (142, 150, 152, 153, 154) in the plurality of data objects (142, 150, 152, 153, 154) are organized into one or more hierarchies (150, 717, 718, 815a-c), and wherein the metadata (144) specifies at least one of the one or more hierarchies (150, 717, 718, 815a-c); and

a workflow management system (102, 130) comprising: a workflow execution engine (133) for managing execution of finite state machines (300, 350, 400, 500, 550, 600, 650), FSMs including a first FSM associated with the first data object and for managing a first workflow for the first data object, wherein the workflow management system (102, 130) is configured to perform, using the at least one computer hardware processor, a method comprising:

when a current workflow state of the first FSM is a first workflow state:

determining a current value of the first attribute of the first data object by accessing the current value of the first attribute in the at least one data store, wherein the current value of the first attribute indicates a first hierarchy of the one or more hierarchies (150, 717, 718, 815a-c), to which the first data object belongs;

identifying, using the current value of the first attribute and the metadata specifying relationships among at least some of the plurality of data objects (142, 150, 152, 153, 154), a first actor authorized to perform a first workflow task for the first data object, wherein identifying the first actor comprises:

identifying the first actor as an actor (115, 139, 156, 158, 176, 382, 392, 704, 708, 713) authorized to perform the first workflow task for a second data object in the plurality of data objects (142, 150, 152, 153, 154), wherein the second data object is related to the first data object according to the first hierarchy;

generating a graphical user interface, GUI (380, 390, 510, 800, 810, 820, 825, 830, 835, 837, 840, 845, 850, 855, 860, 865, 870, 910, 920, 930, 940, 1000) through which the first actor (115, 139, 156, 158, 176, 382, 392, 704, 708, 713) can provide input that the first workflow task is to be performed; and

in response to receiving, from the first actor and through the GUI (380, 390, 510, 800, 810, 820, 825, 830, 835, 837, 840, 845, 850, 855, 860, 865, 870, 910, 920, 930, 940, 1000), input specifying that the first workflow task is to be performed:

performing the first workflow task for the first data object; and

updating the current workflow state of the first FSM to a second workflow state.

12. The data processing system of claim 11, wherein the second data object is an ancestor of the first data object in the first hierarchy, or wherein the second data object is a parent of the first data object in the first hierarchy.

13. The data processing system of claim 11 or 12, wherein the method further comprises:

accessing a first specification for the first FSM for managing the first workflow, the first specification indicating workflow states and transitions among states in the workflow states;

generating the first FSM for managing the first workflow for the first data object using the first specification; and

associating the first FSM with the first data object, preferably wherein the plurality of data objects (142, 150, 152, 153, 154) includes a second data object different from the first data object, wherein the method further comprises:

generating, using the first specification, a second FSM for managing the first workflow for the second data object, wherein the first FSM is different from the second FSM; and

associating the second FSM with the second data object.

14. The data processing system of claim 11, 12 or 13, wherein the first data object comprises a second attribute, wherein the method further comprises:

generating a second FSM for managing a second workflow for changing a value of the second attribute of the first data object; and

concurrently with using the first FSM to manage a first workflow for the first data object, using the second FSM to manage the second workflow for the second attribute of the first data object.

15. The data processing system of any one of claims 11 to 14, wherein the method further comprises:

when the first FSM indicates that the current workflow state of the first workflow for the first data object is the first workflow state,

receiving input from each of multiple actors, including the first actor, input indicating whether or not the first workflow task is to be performed; and

performing the first workflow task for the first data object only when a majority of the multiple actors provides input indicating that the first workflow task is to be performed.