

Tailored Messaging

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the priority benefit of U.S. Patent Application No. 14/329,602, filed July 11, 2014, and entitled “Tailored Messaging,” and claims the priority benefit of U.S. Provisional Patent Application No. 61/845,613, filed July 12, 2013, and entitled “System and Method for Dynamically Distributing Market Data Across Multiple Devices in an Electronic Trading Environment,” and claims the priority benefit of U.S. Provisional Patent Application No. 62/022,736, filed July 10, 2014, and entitled “System and Method for Dynamically Distributing Market Data Across Multiple Devices in an Electronic Trading Environment.” The contents of each of the foregoing applications are herein fully incorporated by reference in their entirety for all purposes.

BACKGROUND

[0002] Electronic devices may exchange data messages to provide up-to-date information regarding, for example, the state of a device. In some systems, multiple recipients are interested in receiving updates from a data source. Techniques such as broadcast or multicast messaging may be used by the data source to provide these updates in certain types of networks. In other systems, some recipients may communicate with the data source using point-to-point connections because of, for example, network limitations, communication preferences (e.g., reliable delivery, ordering, etc.), and/or security requirements.

[0002a] Some recipients may prefer to receive updates from the same data source at different rates. Providing updates at different rates while minimizing sending undesired messages to recipients limits the usefulness of broadcast or multicast messaging techniques and, as the number of recipients with different update rate preferences increases, point-to-point connections become more effective. However, with point-to-point connections, a message must be generated for each recipient. Additionally, some recipients may prefer to receive different levels or tiers of data in their updates. Customizing messages based on different levels or tiers of data requires generating different messages for each level or tier of data. As the number of recipients with different preferences grows, accommodating different update rates and different levels or tiers of data becomes cumbersome, especially for time-sensitive information where increased latency in receiving the data is not acceptable.

SUMMARY

[0003] According to an aspect of the present invention, there is provided a method including: generating, by a computing device, a first snapshot message representing a state of a data source at a first time; sending, by the computing device, the first snapshot message to a first recipient; generating, by the computing device, a first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time; ~~and~~ sending, by the computing device, the first deltasnap message to the first recipient-; generating by the computing device a second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and sending by the computing device the second deltasnap message to the first recipient.

[0003a] According to another aspect of the present invention, there is provided a computer readable medium comprising instructions which, when executed, cause a machine to at least: generate a first snapshot message representing a state of a data source at a first time; send the first snapshot message to a first recipient; generate a first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time; ~~and~~ send the first deltasnap message to the first recipient-; generate a second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and send the second deltasnap message to the first recipient.

[0003b] According to another aspect of the present invention, there is provided a system including: a data formatter to: generate a first snapshot message representing a state of a data source at a first time, and generate a first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time; ~~and~~ generate a second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and a message sender to: send the first snapshot message to a first recipient, ~~and~~ send the first deltasnap message to the first recipient-, and send the second deltasnap message to the first recipient.

[0003c] According to another aspect of the present invention, there is provided a method including: sending, by a computing device, a first snapshot message to a first recipient, the first snapshot message representing a state of a data source at a first time; sending, by the computing device, the first snapshot message to a second recipient; sending, by the computing device, a first deltasnap message to the first recipient, the first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time; sending, by the computing device, a second deltasnap message to the first recipient, the second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and sending, by the computing device, the second deltasnap message to the second recipient.

[0003d] According to another aspect of the present invention, there is provided a computer readable medium comprising instructions which, when executed, cause a machine to at least: send a first snapshot message to a first recipient, the first snapshot message representing a state of a data source at a first time; send the first snapshot message to a second recipient; send a first deltasnap message to the first recipient, the first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time; send a second deltasnap message to the first recipient, the second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and send the second deltasnap message to the second recipient.

[0003e] According to another aspect of the present invention, there is provided a computing device comprising: a processor; and memory storing computer readable instructions which, when executed by the processor, configure the processor to: send a first snapshot message to a first recipient, the first snapshot message representing a state of a data source at a first time; send the first snapshot message to a second recipient; send a first deltasnap message to the first recipient, the first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time; send a second deltasnap message to the first recipient, the second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and send the second deltasnap message to the second recipient.

[0003f] According to another aspect of the present invention, there is provided a method including storing, by a computing device, a snapshot message in a first buffer; sending, by the computing device, a first snapshot message from the first buffer to a first recipient; and sending, by the computing device, a second snapshot message from the first buffer to a second recipient; storing, by the computing device, a deltasnap message in a second buffer; sending, by the computing device, a first deltasnap message from the second buffer to the first recipient; and sending, by the computing device, a second deltasnap message from the second buffer to the second recipient.

[0003g] According to another aspect of the present invention, there is provided a computer readable medium comprising instructions which, when executed, cause a machine to at least: store a snapshot message in a first buffer; send a first snapshot message from the first buffer to a first recipient; and send a second snapshot message from the first buffer to a second

recipient; store a deltasnap message in a second buffer; send a first deltasnap message from the second buffer to the first recipient; and send a second deltasnap message from the second buffer to the second recipient.

[0003h] According to another aspect of the present invention, there is provided a system including: a data formatter to: store a snapshot message in a first buffer; store a deltasnap message in a second buffer; and a message sender to: send a first snapshot message from the first buffer to a first recipient; send a second snapshot message from the first buffer to a second recipient; send a first deltasnap message from the second buffer to the first recipient; and send a second deltasnap message from the second buffer to the second recipient.

[0003i] According to another aspect of the present invention, there is provided a method including: generating, by a computing device, a first snapshot representative of a first set of data captured at a first time; sending, by the computing device, a first version of the first snapshot to a first subscribing device, the first version of the first snapshot tailored according to a first preference of the first subscribing device; generating, by the computing device, a first deltasnap representative of a difference between the first set of data and a second set of data, the second set of data representing data generated at a second time after the first time; and sending, by the computing device, a first version of the first deltasnap to the first subscribing device, the first version of the first deltasnap tailored according to the first preference of the first subscribing device.

[0003j] According to another aspect of the present invention, there is provided a computer readable medium comprising instructions which, when executed, cause a machine to at least: generate a first snapshot representative of a first set of data captured at a first time; send a first version of the first snapshot to a first subscribing device, the first version of the first snapshot tailored according to a first preference of the first subscribing device; generate a first deltasnap representative of a difference between the first set of data and a second set of data, the second set of data representing data generated at a second time after the first time; and send a first version of the first deltasnap to the first subscribing device, the first version of the first deltasnap tailored according to the first preference of the first subscribing device.

[0003k] According to another aspect of the present invention, there is provided a computing device comprising: a processor; and memory storing computer readable instructions which, when executed by the processor, configure the processor to: generate a first snapshot representative of a first set of data captured at a first time; send a first version

of the first snapshot to a first subscribing device, the first version of the first snapshot tailored according to a first preference of the first subscribing device; generate a first deltasnap representative of a difference between the first set of data and a second set of data, the second set of data representing data generated at a second time after the first time; and send a first version of the first deltasnap to the first subscribing device, the first version of the first deltasnap tailored according to the first preference of the first subscribing device.

[0003l] According to another aspect of the present invention, there is provided a method including: generating, by a computing device, a first snapshot representative of a first state of a dataset at a first time; sending, by the computing device, the first snapshot to a first subscribing device and a second subscribing device; generating, by the computing device, a plurality of deltasnaps, each of the plurality of deltasnaps representing a difference between the first state of the dataset at the first time and a subsequent state of the dataset at a time subsequent to the first time; based on a first update rate, sending, by the computing device, a first portion of the plurality of deltasnaps to the first subscribing device; and based on a second update rate, sending, by the computing device, a second portion of the plurality of deltasnaps to the second subscribing device.

[0003m] According to another aspect of the present invention, there is provided a computer readable medium comprising instructions which, when executed, cause a machine to at least: generate a first snapshot representative of a first state of a dataset at a first time; send the first snapshot to a first subscribing device and a second subscribing device; generate a plurality of deltasnaps, each of the plurality of deltasnaps representing a difference between the first state of the dataset at the first time and a subsequent state of the dataset at a time subsequent to the first time; based on a first update rate, send a first portion of the plurality of deltasnaps to the first subscribing device; and based on a second update rate, send a second portion of the plurality of deltasnaps to the second subscribing device.

[0003n] According to another aspect of the present invention, there is provided a computing device comprising: a processor; and memory storing computer readable instructions which, when executed by the processor, configure the processor to: generate a first snapshot representative of a first state of a dataset at a first time; send the first snapshot to a first subscribing device and a second subscribing device; generate a plurality of deltasnaps, each of the plurality of deltasnaps representing a difference between the first state of the dataset at the first time and a subsequent state of the dataset at a time subsequent to the

first time; based on a first update rate, send a first portion of the plurality of deltasnaps to the first subscribing device; and based on a second update rate, send a second portion of the plurality of deltasnaps to the second subscribing device.

[0003o] According to another aspect of the present invention, there is provided a method comprising: generating, by a computing device, a first snapshot message representing a state of data and sending the first snapshot message to one or more recipients; and after generating the first snapshot message, periodically generating, by the computing device, deltasnap messages representing a change in the data represented in the first snapshot message and sending at least a portion of the deltasnap messages to one or more of the recipients.

[0003p] According to another aspect of the present invention, there is provided a computer readable medium comprising instructions which, when executed, cause a machine to at least: generate a first snapshot message representing a state of data and send the first snapshot message to one or more recipients; and after generating the first snapshot message, periodically generate deltasnap messages representing a change in the data represented in the first snapshot message and send at least a portion of the deltasnap messages to one or more of the recipients.

[0003q] According to another aspect of the present invention, there is provided a computing device comprising: a processor; and memory storing computer readable instructions which, when executed by the processor, configure the processor to: generate a first snapshot message representing a state of data and send the first snapshot message to one or more recipients; and after generating the first snapshot message, periodically generate deltasnap messages representing a change in the data represented in the first snapshot message and send at least a portion of the deltasnap messages to one or more of the recipients.

[0003r] According to another aspect of the present invention, there is provided a method comprising: receiving, at a trading device, a first snapshot message, the first snapshot message representing a state of a data source at a first time; receiving, at the trading device, a first deltasnap message, the first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time; based on the first deltasnap message and the first snapshot message, reconstructing at least a portion of the state of the data source at the second time; receiving, at the trading device, a second deltasnap message, the second deltasnap message representing a difference in a state of the data source

at a third time and the state of the data source at the first time; and based on the second deltasnap message and the first snapshot message, reconstructing at least a portion of the state of the data source at the third time.

[0003s] According to another aspect of the present invention, there is provided a computer readable medium comprising instructions which, when executed, cause a machine to at least: receive, at a trading device, a first snapshot message, the first snapshot message representing a state of a data source at a first time; receive, at the trading device, a first deltasnap message, the first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time; based on the first deltasnap message and the first snapshot message, reconstruct at least a portion of the state of the data source at the second time; receive, at the trading device, a second deltasnap message, the second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and based on the second deltasnap message and the first snapshot message, reconstruct at least a portion of the state of the data source at the third time.

[0003t] According to another aspect of the present invention, there is provided a computing device comprising: a processor; and memory storing computer readable instructions which, when executed by the processor, configure the processor to: receive, at a trading device, a first snapshot message, the first snapshot message representing a state of a data source at a first time; receive, at the trading device, a first deltasnap message, the first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time; based on the first deltasnap message and the first snapshot message, reconstruct at least a portion of the state of the data source at the second time; receive, at the trading device, a second deltasnap message, the second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and based on the second deltasnap message and the first snapshot message, reconstruct at least a portion of the state of the data source at the third time.

[0003u] ~~According to another aspect of the present invention, t~~There is also provided a data distribution method comprising: configuring, by a data formatter, a buffer in a memory to store data in a plurality of partitionable data levels, the plurality of partitionable data levels being organized in descending levels of interest; and sending, by a data sender, to at least one

of a plurality of subscriber devices, from the buffer, a first message comprising a first requested data level and all data levels having a level of interest that is greater than or equal to the level of interest of the first requested data level.

[0003v] ~~According to another aspect of the present invention,~~ There is also provided a computer readable medium comprising instructions which, when executed, cause a machine to at least: configure a buffer in a memory to store data in a plurality of partitionable data levels, the plurality of partitionable data levels being organized in descending levels of interest; and send to at least one of a plurality of subscriber devices, from the buffer, a first message comprising a first requested data level and all data levels having a level of interest that is greater than or equal to the level of interest of the first requested data level.

[0003w] ~~According to another aspect of the present invention,~~ There is also provided a data distribution system for distributing data to a plurality of subscriber devices, the data distribution system comprising: a memory; a data formatter to configure a buffer in the memory to store data in a plurality of partitionable data levels, the plurality of partitionable data levels being organized in descending levels of interest; and a data sender to send to at least one of the subscriber devices, from the buffer, a first message comprising a first requested data level and all data levels having a level of interest that is greater than or equal to the level of interest of the first requested data level.

[0003x] ~~According to another aspect of the present invention,~~ There is also provided a method including: generating, by a computing device, a first snapshot message representing a state of a data source at a first time; sending, by the computing device, the first snapshot message to a first recipient; generating, by the computing device, a first update message representing a difference in a state of the data source at a second time and the state of the data source at the first time; sending, by the computing device, the first update message to the first recipient; generating by the computing device a second update message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and sending, by the computing device, the second update message to the first recipient.

[0003y] ~~According to another aspect of the present invention,~~ There is also provided a computer readable medium comprising instructions which, when executed, cause a machine to at least: generate a first snapshot message representing a state of a data source at a first time; send the first snapshot message to a first recipient; generate a first update message representing a difference in a state of the data source at a second time and the state of the data source at the

first time; send the first update message to the first recipient; generate a second update message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and send the second update message to the first recipient.

[0003z] ~~According to another aspect of the present invention, there is also~~ provided a system including: a data formatter arranged to: generate a first snapshot message representing a state of a data source at a first time, generate a first update message representing a difference in a state of the data source at a second time and the state of the data source at the first time, generate a second update message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and a message sender arranged to: send the first snapshot message to a first recipient, send the first update message to the first recipient; and send the second update message to the first recipient.

What is claimed is:

1. A method including:
generating, by a computing device, a first snapshot message representing a state of a data source at a first time;
sending, by the computing device, the first snapshot message to a first recipient;
generating, by the computing device, a first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time; and
sending, by the computing device, the first deltasnap message to the first recipient;
- ~~2. The method of claim 1, further including:~~
generating by the computing device a second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and
sending by the computing device the second deltasnap message to the first recipient.
- ~~32.~~ The method of claim 1, wherein the first deltasnap message includes one or more actions instructing the first recipient to modify the first snapshot message to reflect the state of the data source at the second time.
- ~~43.~~ The method of ~~any one of claims 1 or 2~~, wherein the first snapshot message is organized into a plurality of data levels, each data level specifying a level of detail of the data provided from the data source.
- ~~54.~~ The method of claim ~~43~~, wherein the plurality of data levels are organized in descending order of interest.
- ~~65.~~ The method of any one of claims ~~43~~ or ~~54~~, wherein the first deltasnap message is organized into the plurality of data levels, the first deltasnap message including one or more actions for each of the respective data levels, the actions instructing the first recipient to modify the respective data level to reflect the state of the data source at the second time.

76. The method of any one of claims 1 to 65, further including:

before sending the first deltasnap message to the first recipient, determining, by the computer device, whether a difference between the second time and the first time is greater than an update interval specified by the first recipient; and

if the difference between the second time and the first time is greater than the update interval, sending, by the computing device, the first deltasnap message to the first recipient.

87. The method of any one of claims 1 to 76, wherein the data source is a market for a tradeable object and the first recipient is a first electronic trading device.

98. A computer readable medium comprising instructions which, when executed, cause a machine to at least:

generate a first snapshot message representing a state of a data source at a first time;

send the first snapshot message to a first recipient;

generate a first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time; and

send the first deltasnap message to the first recipient;

~~10. The computer readable medium of claim 9, wherein the instructions further cause the machine to at least:~~

generate a second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and

send the second deltasnap message to the first recipient.

~~11. The computer readable medium of claim 9, wherein the first deltasnap message is to include one or more actions instructing the first recipient to modify the first snapshot message to reflect the state of the data source at the second time.~~

~~12. The computer readable medium of any one of claims 9 to 11 or 9, wherein the first snapshot message is organized into a plurality of data levels, each data level to specify a level of detail of the data from the data source.~~

~~13~~11. The computer readable medium of claim ~~12~~10, wherein the plurality of data levels are organized in descending order of interest.

~~14~~12. The computer readable medium of any one of claims ~~12~~0 or ~~13~~1, wherein the first deltasnap message is organized into the plurality of data levels, the first deltasnap message including one or more actions for each of the respective data levels, the actions to instruct the first recipient to modify the respective data level to reflect the state of the data source at the second time.

~~15~~13. The computer readable medium of any one of claims ~~9~~8 to ~~14~~12, wherein the instructions further cause the machine to at least:

before the first deltasnap message is sent to the first recipient, determine whether a difference between the second time and the first time is greater than an update interval specified by the first recipient; and

if the difference between the second time and the first time is greater than the update interval, send the first deltasnap message to the first recipient.

~~16~~14. The computer readable medium of any one of claims ~~9~~8 to ~~15~~3, wherein the data source is a market for a tradeable object and the first recipient is a first trading device.

~~17~~15. A system including:

a data formatter to:

generate a first snapshot message representing a state of a data source at a first time, and

generate a first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time; ~~and,~~

generate a second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and

a message sender to:

send the first snapshot message to a first recipient, ~~and~~

send the first deltasnap message to the first recipient; ~~and~~

send the second deltasnap message to the first recipient.

~~18. The system of claim 17, further wherein the data formatter is to generate a second deltasnap message representing a difference in a state of the data source at a third time and the~~

~~state of the data source at the first time, and the message sender is to send the second deltasnap message to the first recipient.~~

~~1916.~~ The system of ~~any one of claims 175 or 18,~~ wherein the first deltasnap message is to include one or more actions instructing the first recipient to modify the first snapshot message to reflect the state of the data source at the second time.

~~2017.~~ The system of any one of claims ~~175 to 19~~or ~~16,~~ wherein the first snapshot message is organized into a plurality of data levels, each data level to specify a level of detail of the data from the data source.

~~2118.~~ The system of claim ~~2017,~~ wherein the plurality of data levels are organized in descending order of interest.

~~2219.~~ The system of any one of claims ~~2017~~ or ~~2118,~~ wherein the first deltasnap message is organized into the plurality of data levels, the first deltasnap message including one or more actions for each of the respective data levels, the actions to instruct the first recipient to modify the respective data level to reflect the state of the data source at the second time.

~~2320.~~ The system of any one of claims ~~1715 to 2219,~~ wherein the message sender is to, before the first deltasnap message is sent to the first recipient, determine whether a difference between the second time and the first time is greater than an update interval specified by the first recipient, and if the difference between the second time and the first time is greater than the update interval, send the first deltasnap message to the first recipient.

~~2421.~~ The system of any one of claims ~~1715 to 2320,~~ wherein the data source is a market for a tradeable object and the first recipient is a first trading device.

~~2522.~~ A method including:

- sending, by a computing device, a first snapshot message to a first recipient, the first snapshot message representing a state of a data source at a first time;
- sending, by the computing device, the first snapshot message to a second recipient;

sending, by the computing device, a first deltasnap message to the first recipient, the first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time;

sending, by the computing device, a second deltasnap message to the first recipient, the second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and

sending, by the computing device, the second deltasnap message to the second recipient.

| 2623. The method of claim 2522, wherein sending the first snapshot message to the first recipient further includes tailoring the first snapshot message according to first preferences specified by the first recipient, and sending the first deltasnap message to the first recipient further includes tailoring the first deltasnap message according to the first preferences.

| 2724. The method of any one of claims 252 or 2623, further comprising:
generating, by the computing device, the first snapshot message.

| 2825. The method of any one of claims 2522 to 2724, further comprising:
generating, by the computing device, the first deltasnap message; and
generating, by the computing device, the second deltasnap message.

| 2926. The method of any one of claims 2724 or 28, wherein generating the first snapshot message further includes organizing the state of the data source at the first time into a plurality of first data levels, each data level specifying a level of detail of the data from the data source.

| 3027. The method of claim 2825, wherein generating the first deltasnap message further includes:

organizing the state of the data source at the second time into a plurality of second data levels;

determining a difference between the first data levels and the second data levels; and

generating one or more actions to be included in the first deltasnap message, the action based on the difference between the first data levels and the second data levels.

| 3428. The method of claim 3027, wherein the actions instruct the first recipient to modify one or more first data levels to reflect the state of the data source at the second time.

| 3229. The method of any one of claims 3027 or 3428, wherein the actions are selected from a group comprising an add action, an add top action, an add relative action, a modify value action, a modify all action, a delete action, and a no change action.

| 3330. The method of any one of claims 2522 to 3229, wherein the computing device refrains from sending the first deltasnap message to the second recipient.

| 3431. The method of any one of claims 2522 to 3330, wherein the first recipient and the second recipient are associated with different update rates, each of the update rates specifying the rate at which the associated recipient is to receive updates regarding the state of the data source.

| 3532. The method of any one of claims 2522 to 3431, wherein the first snapshot message comprises market data associated with an exchange and wherein the first deltasnap message represents changes in at least some of the market data.

| 3633. A computer readable medium comprising instructions which, when executed, cause a machine to at least:

- send a first snapshot message to a first recipient, the first snapshot message representing a state of a data source at a first time;
- send the first snapshot message to a second recipient;
- send a first deltasnap message to the first recipient, the first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time;
- send a second deltasnap message to the first recipient, the second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and
- send the second deltasnap message to the second recipient.

3734. The computer readable medium of claim 3633, wherein the instructions further cause the machine to at least:

- tailor the first snapshot message according to first preferences specified by the first recipient; and
- tailor the first deltasnap message according to the first preferences.

3835. The computer readable medium of any one of claims 3633 or 3734, wherein the instructions further cause the machine to at least:

- generate the first snapshot message.

3936. The computer readable medium of any one of claims 3633 to 3835, wherein the instructions further cause the machine to at least:

- generate the first deltasnap message; and
- generate the second deltasnap message.

4037. The computer readable medium of any one of claims 363 to 3936, wherein to generate the first snapshot message, the instructions further cause the machine to at least organize the state of the data source at the first time into a plurality of first data levels, each data level specifying a level of detail of the data from the data source.

4138. The computer readable medium of any one of claims 3633 to 4037, wherein the instructions further cause the machine to at least:

- organize the state of the data source at the second time into a plurality of second data levels;
- determine a difference between the first data levels and the second data levels; and
- generate one or more actions to be included in the first deltasnap message, the action based on the difference between the first data levels and the second data levels.

4239. The computer readable medium of claim 4138, wherein the actions instruct the first recipient to modify one or more first data levels to reflect the state of the data source at the second time

4340. The computer readable medium of any one of claims 4138 or 4239, wherein the actions are selected from a group comprising an add action, an add top action, an add relative action, a modify value action, a modify all action, a delete action, and a no change action.

4441. The computer readable medium of any one of claims 3633 to 4340, the instructions do not cause the machine to send the first deltasnap message to the second recipient.

4542. The computer readable medium of any one of claims 3633 to 4441, wherein the first recipient and the second recipient are associated with different update rates, each of the update rates specifying the rate at which the associated recipient is to receive updates regarding the state of the data source.

4643. The computer readable medium of any one of claims 3633 to 4542, wherein the first snapshot message comprises market data associated with an exchange and wherein the first deltasnap message represents changes in at least some of the market data.

4744. A computing device comprising:

a processor; and

memory storing computer readable instructions which, when executed by the processor, configure the processor to:

send a first snapshot message to a first recipient, the first snapshot message representing a state of a data source at a first time;

send the first snapshot message to a second recipient;

send a first deltasnap message to the first recipient, the first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time;

send a second deltasnap message to the first recipient, the second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and

send the second deltasnap message to the second recipient.

4845. The computing device of claim 4744, wherein the instructions further configure the processor to:

tailor the first snapshot message according to first preferences specified by the first recipient; and
tailor the first deltasnap message according to the first preferences.

4946. The computing device of any one of claims 4744 or 4845, wherein the instructions further configure the processor to:
generate the first snapshot message.

5047. The computing device of any one of claims 4744 to 4946, wherein the instructions further configure the processor to:
generate the first deltasnap message; and
generate the second deltasnap message.

5148. The computing device of any one of claims 4743 to 5047, wherein to generate the first snapshot message, the instructions further configure the processor to organize the state of the data source at the first time into a plurality of first data levels, each data level specifying a level of detail of the data from the data source.

5249. The computing device of any one of claims 4744 to 5148, wherein the instructions further configure the processor to:
organize the state of the data source at the second time into a plurality of second data levels;
determine a difference between the first data levels and the second data levels; and
generate one or more actions to be included in the first deltasnap message, the action based on the difference between the first data levels and the second data levels.

5350. The computing device of claim 5249, wherein the actions instruct the first recipient to modify one or more first data levels to reflect the state of the data source at the second time

5451. The computing device of any one of claims 5249 or 5350, wherein the actions are selected from a group comprising an add action, an add top action, an add relative action, a modify value action, a modify all action, a delete action, and a no change action.

5552. The computing device of any one of claims 5249 to 5451, wherein the instructions do not configure the processor to send the first deltasnap message to the second recipient.

5653. The computing device of any one of claims 5249 to 5552, wherein the first recipient and the second recipient are associated with different update rates, each of the update rates specifying the rate at which the associated recipient is to receive updates regarding the state of the data source.

5754. The computing device of any one of claims 5249 to 5653, wherein the first snapshot message comprises market data associated with an exchange and wherein the first deltasnap message represents changes in at least some of the market data.

5855. A method including:

storing, by a computing device, a snapshot message in a first buffer;

sending, by the computing device, a first snapshot message from the first buffer to a first recipient; and

sending, by the computing device, a second snapshot message from the first buffer to a second recipient;

storing, by the computer device, a deltasnap message in a second buffer;

sending, by the computing device, a first deltasnap message from the second buffer to the first recipient; and

sending, by the computing device, a second deltasnap message from the second buffer to the second recipient.

5956. The method of claim 5855, wherein storing the snapshot message further includes organizing the snapshot message into a first data level and a second data level.

6057. The method of any one of claims 5855 or 5956, wherein the first data level represents data from a data source that is more frequently requested than data represented by the second data level.

6158. The method of any one of claims 5956 to 6057, wherein the first snapshot message includes the first data level, and the second snapshot message includes the first and second data levels.

6259. The method of any one of claims 5855 to 6158, wherein the second deltasnap message is a first portion of the deltasnap message in the second buffer, and the second deltasnap message is a second portion of the deltasnap message in the second buffer.

6360. The method of any one of claims 5855 to 6259, further including generating a first partition table into the first buffer, the first partition table to indicate a first partitionable location of the snapshot message and a second partitionable location of the snapshot message.

6461. The method of claim 6360, wherein the first snapshot message includes the snapshot message up to the first partitionable location, and the second snapshot message includes the snapshot message up to the second partitionable location.

6562. The method of any one of claims 5855 to 6461, wherein the first snapshot message is sent based on a number of data levels requested by the first recipient and wherein the second snapshot message is sent based on a number of data levels requested by the second recipient.

6663. The method of any one of claims 5855 to 6562, wherein the first snapshot message includes a larger portion of the snapshot message than the second snapshot message.

6764. The method of any one of claims 5855 to 6663, wherein the snapshot message represents a state of a data source at a first time and wherein the deltasnap message represents a difference in a state of the data source at a second time and the state of the data source at the first time.

6865. A computer readable medium comprising instructions which, when executed, cause a machine to at least:

- store a snapshot message in a first buffer;
- send a first snapshot message from the first buffer to a first recipient; and
- send a second snapshot message from the first buffer to a second recipient;
- store a deltasnap message in a second buffer;
- send a first deltasnap message from the second buffer to the first recipient; and
- send a second deltasnap message from the second buffer to the second recipient.

6966. The computer readable medium of claim 6863, wherein to store the snapshot message the instructions further cause the machine to organize the snapshot message into a first data level and a second data level.

7067. The computer readable medium of any one of claims 6863 or 6966, wherein the first data level represents data from a data source that is more frequently requested than data represented by the second data level.

7168. The computer readable medium of any one of claims 6966 or 7067, wherein the first snapshot message includes the first data level, and the second snapshot message includes the first and second data levels.

7269. The computer readable medium of any one of claims 6865 to 7168, wherein the second deltasnap message is a first portion of the deltasnap message in the second buffer, and the second deltasnap message is a second portion of the deltasnap message in the second buffer.

7370. The computer readable medium of any one of claims 6865 to 7269, the instructions to further cause the machine to at least generate a first partition table into the first buffer after the snapshot message, the first partition table to indicate a first partitionable location of the snapshot message and a second partitionable location of the snapshot message.

7471. The computer readable medium of claim 7370, wherein the first snapshot message includes the snapshot message up to the first partitionable location, and the second snapshot message includes the snapshot message up to the second partitionable location.

7572. The computer readable medium of any one of claims 6865 to 7471, wherein instructions cause the first snapshot message to be sent based on a number of data levels requested by the first recipient and the second snapshot message to be sent based on a number of data levels requested by the second recipient.

7673. The computer readable medium of any one of claims 6865 to 7572, wherein the first snapshot message includes a larger portion of the snapshot message than the second snapshot message.

7774. The computer readable medium of any one of claims ~~6865~~ to 7673, wherein the snapshot message represents a state of a data source at a first time and wherein the deltasnap message represents a difference in a state of the data source at a second time and the state of the data source at the first time.

7875. A system including:

a data formatter to:

store a snapshot message in a first buffer;

store a deltasnap message in a second buffer; and

a message sender to:

send a first snapshot message from the first buffer to a first recipient;

send a second snapshot message from the first buffer to a second recipient;

send a first deltasnap message from the second buffer to the first recipient; and

send a second deltasnap message from the second buffer to the second recipient.

7976. The system of claim 7875, wherein, to store the snapshot message, the data formatter organizes the snapshot message into a first data level and a second data level.

8077. The system of any one of claims 7875 or 7976, wherein the first data level represents data from a data source that is more frequently requested than data represented by the second data level.

8178. The system of any one of claims 7875 to 8077, wherein the first snapshot message includes the first data level, and the second snapshot message includes the first and second data levels.

8279. The system of any one of claims 7875 to 8178, wherein the second deltasnap message is a first portion of the deltasnap message in the second buffer, and the second deltasnap message is a second portion of the deltasnap message in the second buffer.

8380. The system of any one of claims 7875 to 8279, wherein the data formatter is further to generate a first partition table into the first buffer, the first partition table to indicate a first

partitionable location of the snapshot message and a second partitionable location of the snapshot message.

| 8481. The system of claim 8380, wherein the first snapshot message includes the snapshot message up to the first partitionable location, and the second snapshot message includes the snapshot message up to the second partitionable location.

| 8582. The system of any one of claims 7875 to 8481, wherein the message sender sends the first snapshot message based on a number of data levels requested by the first recipient and wherein the message sender sends the second snapshot message based on a number of data levels requested by the second recipient.

| 8683. The system of any one of claims 7875 to 8582, wherein the first snapshot message includes a larger portion of the snapshot message than the second snapshot message.

| 8784. The system of any one of claims 7875 to 8683, wherein the snapshot message represents a state of a data source at a first time and wherein the deltasnap message represents a difference in a state of the data source at a second time and the state of the data source at the first time.

| 8885. A method including:

generating, by a computing device, a first snapshot representative of a first set of data captured at a first time;

sending, by the computing device, a first version of the first snapshot to a first subscribing device, the first version of the first snapshot tailored according to a first preference of the first subscribing device;

generating, by the computing device, a first deltasnap representative of a difference between the first set of data and a second set of data, the second set of data representing data generated at a second time after the first time; and

sending, by the computing device, a first version of the first deltasnap to the first subscribing device, the first version of the first deltasnap tailored according to the first preference of the first subscribing device.

| 8986. The method of claim 8885, further comprising:

generating, by the computing device, a second deltasnap representative of a difference between the first set of data and a third set of data, the third set of data representing data generated at a third time after the first time and second time; and sending, by the computing device, a first version of the second deltasnap to the first subscribing device, the first version of the second deltasnap tailored according to the first preference of the first subscribing device.

| 9087. The method of any one of claims 8885 or 8986, wherein the first set of data represents a first market update received at the first time from an electronic exchange, and the second set of data represents a second market update received at the second time from the electronic exchange, the first and second market updates relating to a tradeable object.

| 9188. The method of any one of claims 8885 to 9087, further including:

sending, by the computing device, a second version of the first snapshot to a second subscribing device, the second version of the first snapshot tailored according to a second preference of the second subscribing device; and

sending, by the computing device, a second version of the first deltasnap to a second subscribing device, the second version of the first deltasnap tailored according to the second preference of the second subscribing device.

| 9289. The method of any one of claims 8885 to 9188, wherein generating the first snapshot representative of the first set of data further comprises dividing the first set of data into a plurality of data levels representing partitionable portions of the first snapshot.

| 9390. The method of claim 9289, wherein the plurality of data levels are arranged in levels of interest.

| 9491. The method of any one of claims 8885 to 9390, wherein the first snapshot is tailored by sending one or more segments of the first set of data of the first snapshot as defined by the first preference of the first subscribing device.

| 9592. The method of claim 8880, further including:

generating a second deltasnap representative of a difference between the first set of data and a third set of data, the third set of data representing data generated at a third time after the first time and second time;

determining if the difference between the third time and the second time satisfies a first update rate of the first subscribing device; and

if the difference between the third time and the second time satisfies a first update rate, send a first version of the second deltasnap to the first subscribing device, the first version of the second deltasnap tailored according to the first preference of the first subscribing device.

| 9693. A computer readable medium comprising instructions which, when executed, cause a machine to at least:

generate a first snapshot representative of a first set of data captured at a first time;

send a first version of the first snapshot to a first subscribing device, the first version of the first snapshot tailored according to a first preference of the first subscribing device;

generate a first deltasnap representative of a difference between the first set of data and a second set of data, the second set of data representing data generated at a second time after the first time; and

send a first version of the first deltasnap to the first subscribing device, the first version of the first deltasnap tailored according to the first preference of the first subscribing device.

| 9794. The computer readable medium of claim 9693, wherein the instructions further cause the machine to at least:

generate a second deltasnap representative of a difference between the first set of data and a third set of data, the third set of data representing data generated at a third time after the first time and second time; and

send a first version of the second deltasnap to the first subscribing device, the first version of the second deltasnap tailored according to the first preference of the first subscribing device.

| 9895. The computer readable medium of any one of claims 9693 or 9794, wherein the first set of data represents a first market update received at the first time from an electronic exchange, and the second set of data represents a second market update received at the second time from the electronic exchange, the first and second market updates relating to a tradeable object.

| 9996. The computer readable medium of any one of claims 9693 to 9895, wherein the instructions further cause the machine to at least:

send a second version of the first snapshot to a second subscribing device, the second version of the first snapshot tailored according to a second preference of the second subscribing device; and

send a second version of the first deltasnap to a second subscribing device, the second version of the first deltasnap tailored according to the second preference of the second subscribing device.

| 10097. The computer readable medium of any one of claims 9693 to 9996, wherein to generate the first snapshot representative of the first set of data, the instructions further cause the machine to divide the first set of data into a plurality of data levels representing partitionable portions of the first snapshot.

| 10198. The computer readable medium of claim 10097, wherein the plurality of data levels are arranged in levels of interest.

| 10299. The computer readable medium of any one of claims 10097 or 10198, wherein the first snapshot is tailored by sending one or more segments of the first set of data of the first snapshot as defined by the first preference of the first subscribing device.

| 1030. The computer readable medium of claim 9693, wherein the instructions further cause the machine to at least:

generate a second deltasnap representative of a difference between the first set of data and a third set of data, the third set of data representing data generated at a third time after the first time and second time;

determine if the difference between the third time and the second time satisfies a first update rate of the first subscribing device; and
if the difference between the third time and the second time satisfies a first update rate,
send a first version of the second deltasnap to the first subscribing device, the first version of the second deltasnap tailored according to the first preference of the first subscribing device.

1041. A computing device comprising:

a processor; and

memory storing computer readable instructions which, when executed by the processor, configure the processor to:

generate a first snapshot representative of a first set of data captured at a first time;

send a first version of the first snapshot to a first subscribing device, the first version of the first snapshot tailored according to a first preference of the first subscribing device;

generate a first deltasnap representative of a difference between the first set of data and a second set of data, the second set of data representing data generated at a second time after the first time; and

send a first version of the first deltasnap to the first subscribing device, the first version of the first deltasnap tailored according to the first preference of the first subscribing device.

1052. The computing device of claim ~~1041~~101, wherein the instructions further configure the processor to:

generate a second deltasnap representative of a difference between the first set of data and a third set of data, the third set of data representing data generated at a third time after the first time and second time; and

send a first version of the second deltasnap to the first subscribing device, the first version of the second deltasnap tailored according to the first preference of the first subscribing device.

1063. The computing device of any one of claims ~~104~~101 or ~~105~~102, wherein the first set of data represents a first market update received at the first time from an electronic exchange, and the second set of data represents a second market update received at the second time from the electronic exchange, the first and second market updates relating to a tradeable object.

1074. The computing device of any one of claims ~~104~~101 to ~~106~~103, wherein the instructions further configure the processor to:

send a second version of the first snapshot to a second subscribing device, the second version of the first snapshot tailored according to a second preference of the second subscribing device; and

send a second version of the first deltasnap to a second subscribing device, the second version of the first deltasnap tailored according to the second preference of the second subscribing device.

1085. The computing device of any one of claims ~~104~~101 to ~~107~~104, wherein to generate the first snapshot representative of the first set of data, the instructions further configure the processor to divide the first set of data into a plurality of data levels representing partitionable portions of the first snapshot.

1096. The computing device of claim ~~108~~105, wherein the plurality of data levels are arranged in levels of interest.

11007. The computing device of any one of claims ~~104~~101 to ~~109~~106, wherein the first snapshot is tailored by sending one or more segments of the first set of data of the first snapshot as defined by the first preference of the first subscribing device.

11108. The computing device of claim ~~104~~101, wherein the instructions further configure the processor to:

generate a second deltasnap representative of a difference between the first set of data and a third set of data, the third set of data representing data generated at a third time after the first time and second time;

determine if the difference between the third time and the second time satisfies a first update rate of the first subscribing device; and
if the difference between the third time and the second time satisfies a first update rate,
send a first version of the second deltasnap to the first subscribing device, the first version of the second deltasnap tailored according to the first preference of the first subscribing device.

11209. A method including:

generating, by a computing device, a first snapshot representative of a first state of a dataset at a first time;
sending, by the computing device, the first snapshot to a first subscribing device and a second subscribing device;
generating, by the computing device, a plurality of deltasnaps, each of the plurality of deltasnaps representing a difference between the first state of the dataset at the first time and a subsequent state of the dataset at a time subsequent to the first time;
based on a first update rate, sending, by the computing device, a first portion of the plurality of deltasnaps to the first subscribing device ; and
based on a second update rate, sending, by the computing device, a second portion of the plurality of deltasnaps to the second subscribing device.

1130. The method of claim 112109, wherein the first update rate is different from the second update rate.

1141. The method of any one of claims 112109 or 113110, further including:

before sending the first portion of the plurality of deltasnaps to the first subscribing device, tailoring the first portion of the plurality of deltasnaps according to a first preference defined by the first subscribing device; and
before sending the second portion of the plurality of deltasnaps to the second subscribing device, tailoring the second portion of the plurality of deltasnaps according to a second preference defined by the second subscribing device.

1152. The method claim ~~114~~111, wherein the first preference is different from the second preference.

1163. The method of claim ~~114~~111, wherein tailoring the first portion of the plurality of deltasnaps further comprises truncating the first portion of the plurality of deltasnaps according to the first preference of the first subscribing device, and wherein tailoring the second portion of the plurality of deltasnaps further comprises truncating the second portion of the plurality of deltasnaps according to the second preference of the second subscribing device.

1174. The method of any one of claims ~~112~~109 to ~~116~~113, further including:
when a connection to a third subscribing device is detected, sending a third portion of the first snapshot to the third subscribing device; and
sending a third portion of a most recent one of the plurality of deltasnaps to the third subscribing device.

1185. The method of any one of claims ~~112~~109 to ~~117~~114, further including:
after generating the first snapshot representative of the first state of the dataset at a first time and after generating the plurality of deltasnaps, generating, by the computing device, a second snapshot representative of a state of the dataset at a later time;
after generating the second snapshot, generating, by the computing device, a plurality of further deltasnaps;
based on the first update rate, sending, by the computing device, a first portion of the plurality of further deltasnaps to the first subscribing device; and
based on the second update rate, sending, by the computing device, a second portion of the plurality of further datasnaps to the second subscribing device.

1196. A computer readable medium comprising instructions which, when executed, cause a machine to at least:
generate a first snapshot representative of a first state of a dataset at a first time;
send the first snapshot to a first subscribing device and a second subscribing device;

generate a plurality of deltasnaps, each of the plurality of deltasnaps representing a difference between the first state of the dataset at the first time and a subsequent state of the dataset at a time subsequent to the first time;

based on a first update rate, send a first portion of the plurality of deltasnaps to the first subscribing device; and

based on a second update rate, send a second portion of the plurality of deltasnaps to the second subscribing device.

12017. The computer readable medium of claim 119116, wherein the first update rate is different from the second update rate.

12118. The computer readable medium of any one of claims 119116 or 120117, wherein the instructions further cause the machine to at least:

before sending the first portion of the plurality of deltasnaps to the first subscribing device, tailor the first portion of the plurality of deltasnaps according to a first preference defined by the first subscribing device; and

before sending the second portion of the plurality of deltasnaps to the second subscribing device, tailor the second portion of the plurality of deltasnaps according to a second preference defined by the second subscribing device.

12219. The computer readable medium of claim 121118, wherein the first preference is different from the second preference.

1230. The computer readable medium of claim 121118, wherein tailoring the first portion of the plurality of deltasnaps further comprises truncating the first portion of the plurality of deltasnaps according to the first preference of the first subscribing device, and wherein tailoring the second portion of the plurality of deltasnaps further comprises truncating the second portion of the plurality of deltasnaps according to the second preference of the second subscribing device.

1241. The computer readable medium of any one of claims 121118 to 123120, wherein the instructions further cause the machine to at least:

when a connection to a third subscribing device is detected, send a third portion of the first snapshot to the third subscribing device; and
send a third portion of a most recent one of the plurality of deltasnaps to the third subscribing device.

1252. The computer readable medium of any one of claims ~~121~~118 to ~~124~~121, wherein the instructions further cause the machine to at least:

after generating the first snapshot representative of the first state of the dataset at a first time and after generating the plurality of deltasnaps, generate a second snapshot representative of a state of the dataset at a later time;

after generating the second snapshot, generate a plurality of further deltasnaps;

based on the first update rate, send a first portion of the plurality of further deltasnaps to the first subscribing device; and

based on the second update rate, send a second portion of the plurality of further deltasnaps to the second subscribing device.

1263. A computing device comprising:

a processor; and

memory storing computer readable instructions which, when executed by the processor, configure the processor to:

generate a first snapshot representative of a first state of a dataset at a first time;

send the first snapshot to a first subscribing device and a second subscribing device;

generate a plurality of deltasnaps, each of the plurality of deltasnaps representing a difference between the first state of the dataset at the first time and a subsequent state of the dataset at a time subsequent to the first time;

based on a first update rate, send a first portion of the plurality of deltasnaps to the first subscribing device; and

based on a second update rate, send a second portion of the plurality of deltasnaps to the second subscribing device.

1274. The computing device of claim ~~126~~123, wherein the first update rate is different from the second update rate.

1285. The computing device of any one of claims ~~126~~123 or ~~127~~124, wherein the instructions further configure the processor to:

before sending the first portion of the plurality of deltasnaps to the first subscribing device, tailor the first portion of the plurality of deltasnaps according to a first preference defined by the first subscribing device; and

before sending the second portion of the plurality of deltasnaps to the second subscribing device, tailor the second portion of the plurality of deltasnaps according to a second preference defined by the second subscribing device.

1296. The computing device of claim ~~128~~125, wherein the first preference is different from the second preference.

13027. The computing device of claim ~~128~~125, wherein tailoring the first portion of the plurality of deltasnaps further comprises truncating the first portion of the plurality of deltasnaps according to the first preference of the first subscribing device, and wherein tailoring the second portion of the plurality of deltasnaps further comprises truncating the second portion of the plurality of deltasnaps according to the second preference of the second subscribing device.

13128. The computing device of any one of claims ~~126~~123 to ~~130~~127, wherein the instructions further configure the processor to:

when a connection to a third subscribing device is detected, send a third portion of the first snapshot to the third subscribing device; and

send a third portion of a most recent one of the plurality of deltasnaps to the third subscribing device.

13229. The computing device of any one of claims ~~126~~123 to ~~131~~128, wherein the instructions further configure the processor to:

after generating the first snapshot representative of the first state of the dataset at a first time and after generating the plurality of deltasnap, generate a second snapshot representative of a state of the dataset at a later time;

after generating the second snapshot, generate a plurality of further deltasnap;

based on the first update rate, send a first portion of the plurality of further deltasnap to the first subscribing device; and

based on the second update rate, send a second portion of the plurality of the further datasnap to the second subscribing device.

1330. A method comprising:

generating, by a computing device, a first snapshot message representing a state of data and sending the first snapshot message to one or more recipients; and

after generating the first snapshot message, periodically generating, by the computing device, deltasnap messages representing a change in the data represented in the first snapshot message and sending at least a portion of the deltasnap messages to one or more of the recipients.

1341. The method of claim ~~133~~130, wherein sending at least a portion of the deltasnap messages to one or more recipients comprises sending, to a first recipient, deltasnap messages at a period that is different than the period at which the deltasnap messages are generated.

1352. The method of claim ~~134~~131, wherein sending at least a portion of the deltasnap messages to one or more recipients comprises sending, to a second recipient, deltashap messages at a period that is different than the period at which the deltasnap messages are sent to the first recipient.

1363. The method of claim ~~134~~131, wherein the deltasnap messages are sent at a period associated with a preference set by the first recipient.

1374. The method of any one of claims ~~133~~130 to ~~136~~133, wherein the first snapshot message is organized into a plurality of data levels, each data level specifying a level of detail of the data.

1385. The method of claim ~~137~~134, wherein the plurality of data levels are organized in descending order of interest.

1396. The method of any one of claims ~~133~~130 to ~~138~~135, wherein the data represents a market for a tradeable object and the recipients are electronic trading devices.

14037. A computer readable medium comprising instructions which, when executed, cause a machine to at least:

generate a first snapshot message representing a state of data and send the first snapshot message to one or more recipients; and

after generating the first snapshot message, periodically generate deltasnap messages representing a change in the data represented in the first snapshot message and send at least a portion of the deltasnap messages to one or more of the recipients.

14138. The computer readable medium of claim ~~140~~137, wherein sending at least a portion of the deltasnap messages to one or more recipients comprises sending, to a first recipient, deltasnap messages at a period that is different than the period at which the deltasnap messages are generated.

14239. The computer readable medium of claim ~~141~~138, wherein sending at least a portion of the deltasnap messages to one or more recipients comprises sending, to a second recipient, deltasnap messages at a period that is different than the period at which the deltasnap messages are sent to the first recipient.

1430. The computer readable medium of claim ~~141~~138, wherein the instructions cause the machine to send the deltasnap messages at a period associated with a preference set by the first recipient.

1441. The computer readable medium of any one of claims ~~140~~137 to ~~143~~140, wherein the instructions cause the machine to organize the first snapshot message into a plurality of data levels, each data level specifying a level of detail of the data.

1452. The computer readable medium of claim ~~144~~141, wherein the plurality of data levels are organized in descending order of interest.

1463. The computer readable medium of any one of claims ~~140~~137 to ~~145~~142, wherein the data represents a market for a tradeable object and the recipients are electronic trading devices.

1474. A computing device comprising:

a processor; and

memory storing computer readable instructions which, when executed by the processor, configure the processor to:

generate a first snapshot message representing a state of data and send the first snapshot message to one or more recipients; and

after generating the first snapshot message, periodically generate deltasnap messages representing a change in the data represented in the first snapshot message and send at least a portion of the deltasnap messages to one or more of the recipients.

1485. The computing device of claim ~~147~~144, wherein sending at least a portion of the deltasnap messages to one or more recipients comprises sending, to a first recipient, deltasnap messages at a period that is different than the period at which the deltasnap messages are generated.

1496. The computing device of claim ~~148~~145, wherein sending at least a portion of the deltasnap messages to one or more recipients comprises sending, to a second recipient, deltasnap messages at a period that is different than the period at which the deltasnap messages are sent to the first recipient.

15047. The computing device of claim ~~148~~145, wherein the instructions cause the processor to send the deltasnap messages at a period associated with a preference set by the first recipient.

15148. The computing device of any one of claims ~~147~~144 to ~~150~~147, wherein the instructions cause the processor to organize the first snapshot message into a plurality of data levels, each data level specifying a level of detail of the data.

15249. The computing device of claim 151, wherein the plurality of data levels are organized in descending order of interest.

1530. The computing device of any one of claims 147144 to 152149, wherein the data represents a market for a tradeable object and the recipients are electronic trading devices.

1541. A method comprising:

receiving, at a trading device, a first snapshot message, the first snapshot message representing a state of a data source at a first time;

receiving, at the trading device, a first deltasnap message, the first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time;

based on the first deltasnap message and the first snapshot message, reconstructing at least a portion of the state of the data source at the second time;

receiving, at the trading device, a second deltasnap message, the second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and

based on the second deltasnap message and the first snapshot message, reconstructing at least a portion of the state of the data source at the third time.

1552. The method of claim 154151, wherein the first snapshot message comprises market data associated with an exchange and wherein the first deltasnap message represents changes in at least some of the market data.

1563. The method of claim 155152, further comprising:

displaying a representation of at least a portion of the state of the data source at the third time.

1574. The method of any one of claims 155152 or 156153, further comprising:

utilizing at least a portion of the state of the data source at the third time in a trading algorithm to prepare and send an order to the exchange.

1585. The method of any one of claims ~~154~~151 to ~~157~~154, wherein the first deltasnap message includes an action, the action including an index identifying the data in the first snapshot message that is to be modified and information identifying a nature of the modification.

1596. The method of claim ~~158~~155, wherein the information identifying the nature of the modification specifies a price is to be set.

16057. The method of any one of claims ~~154~~151 to ~~159~~156, further comprising:
sending subscription preferences to a system providing the first snapshot message, and
wherein the first snapshot message is in accordance with the subscription preferences.

16158. A computer readable medium comprising instructions which, when executed, cause a machine to at least:
receive, at a trading device, a first snapshot message, the first snapshot message representing a state of a data source at a first time;
receive, at the trading device, a first deltasnap message, the first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time;
based on the first deltasnap message and the first snapshot message, reconstruct at least a portion of the state of the data source at the second time;
receive, at the trading device, a second deltasnap message, the second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and
based on the second deltasnap message and the first snapshot message, reconstruct at least a portion of the state of the data source at the third time.

16259. The computer readable medium of claim ~~161~~158, wherein the first snapshot message comprises market data associated with an exchange and wherein the first deltasnap message represents changes in at least some of the market data.

1630. The computer readable medium of claim ~~161~~158, wherein the instructions further cause the machine to at least:

display a representation of at least a portion of the state of the data source at the third time.

1641. The computer readable medium of any one of claims ~~162~~159 or ~~163~~160, wherein the instructions further cause the machine to at least:

utilize at least a portion of the state of the data source at the third time in a trading algorithm to prepare and send an order to the exchange.

1652. The computer readable medium of any one of claims ~~161~~158 to ~~164~~161, wherein the first deltasnap message includes an action, the action including an index identifying the data in the first snapshot message that is to be modified and information identifying a nature of the modification.

1663. The computer readable medium of claim ~~165~~162, wherein the information identifying the nature of the modification specifies a price is to be set.

1674. The computer readable medium of any one of claims ~~161~~158 to ~~166~~163, wherein the instructions further cause the machine to at least:

send subscription preferences to a system providing the first snapshot message, and wherein the first snapshot message is in accordance with the subscription preferences.

1685. A computing device comprising:

a processor; and

memory storing computer readable instructions which, when executed by the processor, configure the processor to:

receive, at a trading device, a first snapshot message, the first snapshot message representing a state of a data source at a first time;

receive, at the trading device, a first deltasnap message, the first deltasnap message representing a difference in a state of the data source at a second time and the state of the data source at the first time;

based on the first deltasnap message and the first snapshot message, reconstruct at least a portion of the state of the data source at the second time;

receive, at the trading device, a second deltasnap message, the second deltasnap message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and

based on the second deltasnap message and the first snapshot message, reconstruct at least a portion of the state of the data source at the third time.

1696. The computing device of claim ~~168~~165, wherein the first snapshot message comprises market data associated with an exchange and wherein the first deltasnap message represents changes in at least some of the market data.

17067. The computing device of claim ~~169~~166, wherein the instructions configure the processor to:

display a representation of at least a portion of the state of the data source at the third time.

17168. The computing device of any one of claims ~~169~~166 or ~~170~~167, wherein the instructions further configure the processor to:

utilize at least a portion of the state of the data source at the third time in a trading algorithm to prepare and send an order to the exchange.

17269. The computing device of any one of claims ~~168~~165 to ~~171~~168, wherein the first deltasnap message includes an action, the action including an index identifying the data in the first snapshot message that is to be modified and information identifying a nature of the modification.

1730. The computing device of claim ~~172~~169, wherein the information identifying the nature of the modification specifies a price is to be set.

1741. The computing device of any one of claims ~~168~~165 to ~~173~~170, wherein the instructions further configure the processor to:

send subscription preferences to a system providing the first snapshot message, and wherein the first snapshot message is in accordance with the subscription preferences.

~~175.—A data distribution method comprising:~~

~~configuring, by a data formatter, a buffer in a memory to store data in a plurality of partitionable data levels, the plurality of partitionable data levels being organized in descending levels of interest; and~~

~~sending, by a data sender, to at least one of a plurality of subscriber devices, from the buffer, a first message comprising a first requested data level and all data levels having a level of interest that is greater than or equal to the level of interest of the first requested data level.~~

~~176.—The data distribution method of claim 175, further comprising, sending, to at least a further one of the plurality of subscriber devices, from the buffer, a second message comprising a second requested data level and all data levels having a level of interest that is greater than or equal to the level of interest of the second requested data level.~~

~~177.—The data distribution method of claim 176, wherein the second message is sent without remarshaling of the data in the buffer by the data formatter.~~

~~178.—The data distribution method of any one of claims 175 to 177, further comprising: storing a header, the header including bookkeeping information associated with the plurality of partitionable data levels.~~

~~179.—The data distribution method of claim 178, wherein the bookkeeping information comprises a number of the partitionable data levels.~~

~~180.—The data distribution method of any one of claims 178 or 179, wherein the bookkeeping information comprises a timestamp.~~

~~181. The data distribution method of any one of claims 175 to 180, wherein, to send the first message, the data sender places a socket write call referencing the buffer and a length to include the first requested data level and all of the levels having a level of interest that is greater than or equal to the level of interest of the first requested data level.~~

~~182. The data distribution method of any one of claims 175 to 181, further including generating a first partition table, the first partition table to indicate a first partitionable location of the plurality of partitionable data levels and a second partitionable location of the plurality of partitionable data levels.~~

~~183. The data distribution method of claim 182, wherein the first partition table is generated into the buffer.~~

~~184. The data distribution method of any one of claims 182 or 183, wherein the first message includes the partitionable data levels up to the first partitionable location, and a second message includes the partitionable data levels up to the second partitionable location.~~

~~185. A computer readable medium comprising instructions which, when executed, cause a machine to at least:~~

~~configure a buffer in a memory to store data in a plurality of partitionable data levels, the plurality of partitionable data levels being organized in descending levels of interest; and send to at least one of a plurality of subscriber devices, from the buffer, a first message comprising a first requested data level and all data levels having a level of interest that is greater than or equal to the level of interest of the first requested data level.~~

~~186. The computer readable medium of claim 185, wherein the instructions further cause the machine to at least: send to at least a further one of the plurality of subscriber devices, from the buffer, a second message comprising a second requested data level and all data levels having a level of interest that is greater than or equal to the level of interest of the second requested data level.~~

187.—The computer readable medium of claim 186, wherein the instructions cause the machine to send the second message without remarshaling of the data in the buffer.

188.—The computer readable medium of any one of claims 185 to 187, wherein the instructions further cause the machine to store a header, the header including bookkeeping information associated with the plurality of partitionable data levels.

189.—The computer readable medium of claim 188, wherein the bookkeeping information comprises a number of the partitionable data levels.

190.—The computer readable medium of any one of claims 188 or 189, wherein the bookkeeping information comprises a timestamp.

191.—The computer readable medium of any one of claims 184 to 190, wherein, to send the first message, the instructions cause the machine to place a socket write call referencing the buffer and a length to include the first requested data level and all of the levels having a level of interest that is greater than or equal to the level of interest of the first requested data level.

192.—The computer readable medium of any one of claims 185 to 191, wherein the instructions further cause the machine to generate a first partition table, the first partition table to indicate a first partitionable location of the plurality of partitionable data levels and a second partitionable location of the plurality of partitionable data levels.

193.—The computer readable medium of claim 192, wherein to generate the first partition table, the instructions cause the first partition table to be generated into the buffer.

194.—The computer readable medium of any one of claims 192 or 193, wherein the first message includes the partitionable data levels up to the first partitionable location, and a second message includes the partitionable data levels up to the second partitionable location.

195.—A data distribution system for distributing data to a plurality of subscriber devices, the data distribution system comprising:

a memory;

a data formatter to configure a buffer in the memory to store data in a plurality of partitionable data levels, the plurality of partitionable data levels being organized in descending levels of interest; and

a data sender to send to at least one of the subscriber devices, from the buffer, a first message comprising a first requested data level and all data levels having a level of interest that is greater than or equal to the level of interest of the first requested data level.

196.—The data distribution system of claim 195, wherein the data sender is further to send to at least a further one of the plurality of subscriber devices, from the buffer, a second message comprising a second requested data level and all data levels having a level of interest that is greater than or equal to the level of interest of the second requested data level.

197.—The data distribution system of claim 196, wherein the second message is sent without remarshaling of the data in the buffer.

198.—The data distribution system of any one of claims 195 to 197, wherein the data formatter further configures the buffer to store a header, the header including bookkeeping information associated with the plurality of partitionable data levels.

199.—The data distribution system of claim 198, wherein the bookkeeping information comprises a number of the partitionable data levels.

200.—The data distribution system of any one of claims 198 or 199, wherein the bookkeeping information comprises a timestamp.

201.—The data distribution system of any one of claims 195 to 200, wherein, to send the first message, the data sender places a socket write call referencing the buffer and a length to include the first requested data level and all of the levels having a level of interest that is greater than or equal to the level of interest of the first requested data level.

202. —The data distribution system of any one of claims 195 to 201, wherein the data formatter is further to generate a first partition table, the first partition table to indicate a first partitionable location of the plurality of partitionable data levels and a second partitionable location of the plurality of partitionable data levels.

203. —The data distribution system of claim 202, wherein the first partition table is generated into the buffer.

204. —The data distribution method of any one of claims 202 or 203, wherein the first message includes the partitionable data levels up to the first partitionable location, and a second message includes the partitionable data levels up to the second partitionable location.

205. —A method including:

- generating, by a computing device, a first snapshot message representing a state of a data source at a first time;
- sending, by the computing device, the first snapshot message to a first recipient;
- generating, by the computing device, a first update message representing a difference in a state of the data source at a second time and the state of the data source at the first time;
- sending, by the computing device, the first update message to the first recipient;
- generating by the computing device a second update message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and
- sending, by the computing device, the second update message to the first recipient.

206. —The method of claim 205, wherein the first update message includes one or more actions instructing the first recipient to modify the first snapshot message to reflect the state of the data source at the second time.

207. —The method of claims 205 or 206, wherein the first snapshot message is organized into a plurality of data levels, each data level specifying a level of detail of the data provided from the data source.

~~208. The method of claim 207, wherein the plurality of data levels are organized in descending order according to the frequency with which they are requested.~~

~~209. The method of claims 207 or 208, wherein the first update message is organized into the plurality of data levels, the first update message including one or more actions for each of the respective data levels, the actions instructing the first recipient to modify the respective data level to reflect the state of the data source at the second time.~~

~~210. The method of any of claims 205 to 209, further including:~~

~~— before sending the first update message to the first recipient, determining, by the computer device, whether a difference between the second time and the first time is greater than an update interval specified by the first recipient; and~~

~~— if the difference between the first time and the second time is greater than the update rate, sending, by the computing device, the first update message to the first recipient.~~

~~211~~172. The method of any of claims ~~205 to 210~~ 1 to 7, further comprising:

sending, by the computing device, the first snapshot message to a second recipient; and

sending by the computing device the second ~~update~~ deltasnap message to the second recipient.

~~212~~173. The method of any of claims ~~205 to 211~~ 1 to 7 or 172, wherein sending the first snapshot message to the first recipient further includes tailoring the first snapshot message according to first preferences specified by the first recipient, and sending the first ~~update~~ deltasnap message to the first recipient further includes tailoring the first ~~update~~ deltasnap message according to the first preferences.

~~213~~174. The method of any of claims 1 to 7 or 172 to 173~~205 to 212~~, wherein:

generating the first snapshot message further includes organizing the state of the data source at the first time into a plurality of first data levels, each data level specifying a level of detail of the data from the data source; and

generating the first ~~update~~ deltasnap message further includes:

organizing the state of the data source at the second time into a plurality of second data levels;

determining a difference between the first data levels and the second data levels;
and

generating one or more actions to be included in the first ~~update-deltasnap~~ message, the action being based on the difference between the first data levels and the second data levels.

214175. The method of claim-~~213~~ 174, wherein the actions instruct the first recipient to modify one or more first data levels to reflect the state of the data source at the second time.

215176. The method of any one of claims ~~213-174~~ or 214175, wherein the first data level represents data from a data source that is more frequently requested than data represented by the second data level.

216177. The method of any of claims ~~205 to 215~~ 1 to 7 or 172 to 176, further comprising:
generating, by a computing device, a snapshot message into a first buffer;
sending, by the computing device, the first snapshot message from the first buffer to the first recipient;
sending, by the computing device, a second snapshot message from the first buffer to a second recipient;
generating, by the computing device, an ~~update-deltasnap~~ message into a second buffer;
sending, by the computing device, the first ~~update-deltasnap~~ message from the second buffer to the first recipient; and
sending, by the computing device, the second ~~update-deltasnap~~ message from the second buffer to the second recipient.

217178. The method of claim-~~216~~ 177, wherein the first snapshot message includes the first data level, and the second snapshot message includes the first and second data levels.

218179. The method of any one of claims ~~216-177~~ or ~~217~~ 178, wherein the second ~~update deltasnap~~ message is a first portion of the ~~update-deltasnap~~ message in the second buffer, and the second ~~update-deltasnap~~ message is a second portion of the ~~update-deltasnap~~ message in the second buffer.

219180. The method of any of claims 216-177 to 218 179, further including generating a first partition table in the first buffer at a location after that corresponding to the snapshot message in the first buffer, the first partition table being configured to indicate a first partitionable location of the snapshot message and a second partitionable location of the snapshot message.

220181. The method of claim 219 180, wherein the first snapshot message includes the snapshot message up to the first partitionable location, and the second snapshot message includes the snapshot message up to the second partitionable location.

221182. The method of any of claims 216-177 to 220 181, further comprising:
sending the first snapshot message to a first subscribing device and a second subscribing device;
generating a plurality of update-deltasnap messages, each of the plurality of deltasnap update messages representing a difference between a first state of a dataset at the first time and a subsequent state of the dataset at a time subsequent to the first time;
sending a first portion of the plurality of update-deltasnap messages to the first subscribing device corresponding to a first conflation rate; and
sending a second portion of the plurality of update-deltasnap messages to the second subscribing device corresponding to a second conflation rate.

222183. The method of claim 221 182, further including:
before sending the first portion of the plurality of update-deltasnap messages to the first subscribing device, tailoring the first portion of the plurality of update-deltasnap messages according to a first preference defined by the first subscribing device; and
before sending the second portion of the plurality of update-deltasnap messages to the second subscribing device, tailoring the second portion of the plurality of update-deltasnap messages according to a second preference defined by the second subscribing device.

223184. The method of claim 222 183, wherein tailoring the first portion of the plurality of update-deltasnap messages further comprises truncating the first portion of the plurality of update deltasnap messages according to the first preference of the first subscribing device, and wherein tailoring the second

portion of the plurality of ~~update-deltasnap~~ messages further comprises truncating the second portion of the plurality of ~~update-deltasnap~~ messages according to the second preference of the second subscribing device.

~~224~~185. The method of any of claims ~~221-182~~ to ~~223~~ 184, further including:

when a connection to a third subscribing device is detected, sending a third portion of the first snapshot message to the third subscribing device; and

sending a third portion of a most recent one of the plurality of ~~update-deltasnap~~ messages to the third subscribing device.

~~225.~~ A computer readable medium comprising instructions which, when executed, cause a machine to at least:

- ~~generate a first snapshot message representing a state of a data source at a first time;~~
- ~~send the first snapshot message to a first recipient;~~
- ~~generate a first update message representing a difference in a state of the data source at a second time and the state of the data source at the first time;~~
- ~~send the first update message to the first recipient;~~
- ~~generate a second update message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and~~
- ~~send the second update message to the first recipient.~~

~~226.~~ The computer readable medium of claim ~~225~~, wherein the first update message includes one or more actions instructing the first recipient to modify the first snapshot message to reflect the state of the data source at the second time.

~~227.~~ The computer readable medium of claims ~~225~~ or ~~226~~, wherein the first snapshot message is organized into a plurality of data levels, each data level specifying a level of detail of the data provided from the data source.

~~228.~~ The computer readable medium of claim ~~227~~, wherein the plurality of data levels are organized in descending order according to the frequency with which they are requested.

~~229.~~ The computer readable medium of claims ~~227 or 228~~, wherein the first update message is organized into the plurality of data levels, the first update message including one or more actions for each of the respective data levels, the actions instructing the first recipient to modify the respective data level to reflect the state of the data source at the second time.

~~230.~~ The computer readable medium of any of claims ~~225 to 229~~, wherein the instructions further cause the machine to:

~~— before sending the first update message to the first recipient, determine whether a difference between the second time and the first time is greater than an update interval specified by the first recipient; and~~

~~— if the difference between the first time and the second time is greater than the update rate, send the first update message to the first recipient.~~

~~231~~186. The computer readable medium of any of claims ~~225 to 230~~8 to 14, wherein the instructions further cause the machine to:

send the first snapshot message to a second recipient; and

send the second ~~update-deltasnap~~ message to the second recipient.

~~232~~187. The computer readable medium of any of claims ~~225 to 231~~8 to 14 or 186, wherein sending the first snapshot message to the first recipient further includes tailoring the first snapshot message according to first preferences specified by the first recipient, and sending the first ~~update-deltasnap~~ message to the first recipient further includes tailoring the first ~~update-deltasnap~~ message according to the first preferences.

~~233~~188. The computer readable medium of any of claims ~~225 to 232~~8 to 14 or 186 to 187, wherein:

generating the first snapshot message further includes organizing the state of the data source at the first time into a plurality of first data levels, each data level specifying a level of detail of the data from the data source; and

generating the first ~~update-deltasnap~~ message further includes:

organizing the state of the data source at the second time into a plurality of second data levels;

determining a difference between the first data levels and the second data levels;
and

generating one or more actions to be included in the first ~~update-deltasnap~~ message, the action being based on the difference between the first data levels and the second data levels.

234189. The computer readable medium of claim ~~233~~ 188, wherein the actions instruct the first recipient to modify one or more first data levels to reflect the state of the data source at the second time.

235190. The computer readable medium of any one of claims ~~233~~ 188 or 234189, wherein the first data level represents data from a data source that is more frequently requested than data represented by the second data level.

236191. The computer readable medium of any of claims ~~225 to 233~~ 8 to 14 or 186 to 190, wherein the instructions further cause the machine to:

generate a snapshot message into a first buffer;

send the first snapshot message from the first buffer to the first recipient; and

send a second snapshot message from the first buffer to a second recipient;

generate an ~~update-deltasnap~~ message into a second buffer;

send the first ~~update-deltasnap~~ message from the second buffer to the first recipient; and

send the second ~~update-deltasnap~~ message from the second buffer to the second recipient.

237192. The computer readable medium of claim ~~236~~ 191, wherein the first snapshot message includes the first data level, and the second snapshot message includes the first and second data levels.

238193. The computer readable medium of claims ~~236~~ 191 or 237192, wherein the second ~~update-deltasnap~~ message is a first portion of the ~~update-deltasnap~~ message in the second buffer, and the second ~~update-deltasnap~~ message is a second portion of the ~~update-deltasnap~~ message in the second buffer.

239194. The computer readable medium of any of claims ~~236191~~ to ~~238193~~, wherein the instructions further cause the machine to:

generate a first partition table in the first buffer at a location after that corresponding to the snapshot message in the first buffer, the first partition table being configured to indicate a first partitionable location of the snapshot message and a second partitionable location of the snapshot message.

240195. The computer readable medium of claim 239194, wherein the first snapshot message includes the snapshot message up to the first partitionable location, and the second snapshot message includes the snapshot message up to the second partitionable location.

241196. The computer readable medium of any of claims ~~225 to 240~~ 8 to 14 or 186 to 195, wherein the instructions further cause the machine to:

send the first snapshot message to a first subscribing device and a second subscribing device;

generate a plurality of ~~update-deltasnap~~ messages, each of the plurality of ~~update-deltasnap~~ messages representing a difference between a first state of a dataset at the first time and a subsequent state of the dataset at a time subsequent to the first time;

send a first portion of the plurality of ~~update-deltasnap~~ messages to the first subscribing device corresponding to a first conflation rate; and

send a second portion of the plurality of ~~update-deltasnap~~ messages to the second subscribing device corresponding to a second conflation rate.

242197. The computer readable medium of claim 241196, wherein the instructions further cause the machine to:

before sending the first portion of the plurality of ~~update-deltasnap~~ messages to the first subscribing device, tailor the first portion of the plurality of ~~update-deltasnap~~ messages according to a first preference defined by the first subscribing device; and

before sending the second portion of the plurality of ~~update-deltasnap~~ messages to the second subscribing device, tailor the second portion of the plurality of ~~update-deltasnap~~ messages according to a second preference defined by the second subscribing device.

243198. The computer readable medium of claim 242197, wherein tailoring the first portion of the plurality of ~~update-deltasnap~~ messages further comprises truncating the first portion of the plurality of ~~update-deltasnap~~ messages according to the first preference of the first subscribing device, and wherein tailoring the second portion of the plurality of ~~update-deltasnap~~ messages further comprises truncating the second portion of the plurality of ~~update-deltasnap~~ messages according to the second preference of the second subscribing device.

244199. The computer readable medium of any of claims 242196 to 243198, wherein the instructions further cause the machine to:

when a connection to a third subscribing device is detected, send a third portion of the first snapshot message to the third subscribing device; and

send a third portion of a most recent one of the plurality of ~~update-deltasnap~~ messages to the third subscribing device.

245. A system including:

—— a data formatter arranged to:

—— generate a first snapshot message representing a state of a data source at a first time;

—— generate a first update message representing a difference in a state of the data source at a second time and the state of the data source at the first time;

generate a second update message representing a difference in a state of the data source at a third time and the state of the data source at the first time; and

—— a message sender arranged to:

—— send the first snapshot message to a first recipient;

—— send the first update message to the first recipient; and

send the second update message to the first recipient.

246. The system of claim 245, wherein the first update message includes one or more actions instructing the first recipient to modify the first snapshot message to reflect the state of the data source at the second time.

~~247. The system of claims 245 or 246, wherein the first snapshot message is organized into a plurality of data levels, each data level specifying a level of detail of the data provided from the data source.~~

~~248. The system of claim 245, wherein the plurality of data levels are organized in descending order according to the frequency with which they are requested.~~

~~249. The system of claims 247 or 248, wherein the first update message is organized into the plurality of data levels, the first update message including one or more actions for each of the respective data levels, the actions instructing the first recipient to modify the respective data level to reflect the state of the data source at the second time.~~

~~250. The system of any of claims 245 to 249, wherein the data formatter is further arranged to:~~
~~—— before the data sender sends the first update message to the first recipient, determine whether a difference between the second time and the first time is greater than an update interval specified by the first recipient,~~
~~—— and wherein the message sender is further arranged to, if the difference between the first time and the second time is greater than the update rate, send the first update message to the first recipient.~~

~~25100. The system of any of claims 245 to 250~~15 to 21, wherein the message sender is further arranged to:

send the first snapshot message to a second recipient; and

send the second ~~update-deltasnap~~ message to the second recipient.

~~25201. The system of any of claims 245 to 251~~15 to 21 or 200, wherein sending the first snapshot message to the first recipient further includes tailoring the first snapshot message according to first preferences specified by the first recipient, and sending the first ~~update-deltasnap~~ message to the first recipient further includes tailoring the first ~~update-deltasnap~~ message according to the first preferences.

~~25302. The system of any of claims 245 to 252~~15 to 21 or 200 to 201, wherein:

generating the first snapshot message further includes organizing the state of the data source at the first time into a plurality of first data levels, each data level specifying a level of detail of the data from the data source; and

generating the first ~~update-deltasnap~~ message further includes:

organizing the state of the data source at the second time into a plurality of second data levels;

determining a difference between the first data levels and the second data levels; and

generating one or more actions to be included in the first ~~update-deltasnap~~ message, the action being based on the difference between the first data levels and the second data levels.

25403. The system of claim ~~253~~202, wherein the actions instruct the first recipient to modify one or more first data levels to reflect the state of the data source at the second time.

25504. The system of any one of claims ~~253~~202 or ~~254~~203, wherein the first data level represents data from a data source that is more frequently requested than data represented by the second data level.

25605. The system of any of claims ~~245 to 255~~15 to 21 or ~~200 to 204~~, wherein the message sender is further arranged to:

generate a snapshot message into a first buffer;

send the first snapshot message from the first buffer to the first recipient;

send a second snapshot message from the first buffer to a second recipient;

generate an ~~update-deltasnap~~ message into a second buffer;

send the first ~~update-deltasnap~~ message from the second buffer to the first recipient; and

send the second ~~update-deltasnap~~ message from the second buffer to the second recipient.

25706. The system of claim ~~256~~205, wherein the first snapshot message includes the first data level, and the second snapshot message includes the first and second data levels.

25807. The system of claims ~~256205~~ or ~~257206~~, wherein the second ~~update-deltasnap~~ message is a first portion of the ~~update-deltasnap~~ message in the second buffer, and the second ~~update-deltasnap~~ message is a second portion of the ~~update-deltasnap~~ message in the second buffer.

25908. The system of any of claims ~~256205~~ to ~~258207~~, wherein the data formatter is further arranged to: generate a first partition table in the first buffer at a location after that corresponding to the snapshot message in the first buffer, the first partition table being configured to indicate a first partitionable location of the snapshot message and a second partitionable location of the snapshot message.

26009. The system of claim ~~259208~~, wherein the first snapshot message includes the snapshot message up to the first partitionable location, and the second snapshot message includes the snapshot message up to the second partitionable location.

26110. The system of any of claims ~~245 to 26015~~ to ~~21~~ or ~~200 to 209~~, wherein the data formatter is further arranged to:

- generate a plurality of ~~update-deltasnap~~ messages, each of the plurality of ~~update-deltasnap~~ messages representing a difference between a first state of a dataset at the first time and a subsequent state of the dataset at a time subsequent to the first time,

- and wherein the message sender is further arranged to:

- send the first snapshot message to a first subscribing device and a second subscribing device;

- send a first portion of the plurality of ~~update-deltasnap~~ messages to the first subscribing device corresponding to a first conflation rate; and

- send a second portion of the plurality of ~~update-deltasnap~~ messages to the second subscribing device corresponding to a second conflation rate.

26211. The system of claim ~~261210~~, wherein the data formatter is further arranged to:

- before the sending of the first portion of the plurality of ~~update-deltasnap~~ messages to the first subscribing device by the message sender, tailor the first portion of the plurality of ~~update-deltasnap~~ messages according to a first preference defined by the first subscribing device; and

before sending, by the data sender, of the second portion of the plurality of ~~update deltasnap~~ messages to the second subscribing device, tailor the second portion of the plurality of ~~update-deltasnap~~ messages according to a second preference defined by the second subscribing device.

26312. The system of claim ~~262~~211, wherein tailoring the first portion of the plurality of ~~update deltasnap~~ messages further comprises truncating the first portion of the plurality of ~~update deltasnap~~ messages according to the first preference of the first subscribing device, and wherein tailoring the second portion of the plurality of ~~update-deltasnap~~ messages further comprises truncating the second portion of the plurality of ~~update-deltasnap~~ messages according to the second preference of the second subscribing device.

26413. The system of any of claims ~~245 to 263~~210 to 212, wherein the message sender is further arranged to:

when a connection to a third subscribing device is detected, send a third portion of the first snapshot message to the third subscribing device; and

send a third portion of a most recent one of the plurality of ~~update-deltasnap~~ messages to the third subscribing device.