CLAIMS

1. A non-transitory computer-readable storage medium having computer-executable instructions stored thereon that are executable by a processor device to perform or control performance of operations comprising:

mapping at least some data of a data source to a contract such that the contract is satisfied, including:

applying a first reversible transform to at least some of the data of the data source to generate a first intermediate data structure without modifying the at least some of the data of the data source; and

applying a second reversible transform to the first intermediate data structure to generate a second intermediate data structure without modifying the at least some of the data of the data source, wherein at least one of the first intermediate data structure or the second intermediate data structure is in a format suitable to satisfy the contract; and

displaying a visualization of the at least some data of the data source based on the contract, the displayed visualization having a visualization type specified by the contract.

2. The non-transitory computer-readable storage medium of claim 1, wherein applying each of the first and second reversible transforms comprises applying at least one of: a field renaming transform, a list unrolling transform, a distinct value transform, a join transform, a union transform, or a filter transform.

3. The non-transitory computer-readable storage medium of claim 1, the operations further comprising:

receiving user input to revise a graphical object in the visualization;

following a transform rule of each of the first and second reversible transforms backward to identify particular data of the data source to revise to effect the revision to the graphical object;

revising the particular data of the data source to effect the revision to the graphical object;

remapping the at least some data of the data source that includes the revised particular data to the contract such that the contract is satisfied; and

redisplaying the visualization of the at least some data of the data source based on the contract, the redisplayed visualization having the revised graphical object.

4. The non-transitory computer-readable storage medium of claim 3, wherein:

the displayed visualization comprises a container visualization that includes a plurality of items organized in a plurality of containers;

the user input comprises removal of a particular item of the plurality of items from a particular container of the plurality of containers; and

revising the particular data of the data source to effect the revision to the graphical object comprises removing a value assigned to the particular container from a record of the particular item that is included in an original data collection of the data source.

5. The non-transitory computer-readable storage medium of claim 3, wherein:

the displayed visualization comprises a container visualization that includes a plurality of items organized in a plurality of containers;

the user input comprises renaming a particular container of the plurality of containers from a first container name to a second container name;

the particular container includes one or more of the plurality of items; and

revising the particular data of the data source to effect the revision to the graphical object comprises changing a value assigned to the particular container from the first container name to the second container name in each of one or more records of the one or more of the plurality of items, the one or more records included in an original data collection of the data source.

6. The non-transitory computer-readable storage medium of claim 3, wherein following the transform rule of each of the first and second reversible transforms backward to identify the particular data of the data source to revise to effect the revision to the graphical object comprises following the transform rule of each of the first and second reversible transforms backward to identify how one or more values of the graphical object are generated and where the one or more values come from in the data source.

7. A method to generate a visualization of data from a data source based on a contract, the method comprising:

applying a first reversible transform to data of a data source to generate a first intermediate data structure without modifying the data of the data source;

applying a second reversible transform to the first intermediate data structure to generate a second intermediate data structure without modifying the data of the data source, wherein at least one of the first intermediate data structure or the second intermediate data structure is in a format suitable to satisfy a contract; and

displaying a visualization of the data of the data source based on the contract satisfied by one or both of the first intermediate data structure or the second intermediate data structure, the displayed visualization having a visualization type specified by the contract.

8. The method of claim 7, wherein applying each of the first and second reversible transforms comprises applying at least one of: a field renaming transform, a list unrolling transform, a distinct value transform, a join transform, a union transform, or a filter transform.

9. The method of claim 7, further comprising:

receiving user input to revise a graphical object in the visualization;

following a transform rule of each of the first and second reversible transforms backward to identify particular data of the data source to revise to effect the revision to the graphical object;

revising the particular data of the data source to effect the revision to the graphical object;

applying the first reversible transform to the revised data of the data source to generate a revised first intermediate data structure;

applying the second reversible transform to the revised first intermediate data structure to generate a revised second intermediate data structure, wherein at least one of the revised first intermediate data structure or the revised second intermediate data structure is in a format suitable to satisfy the contract; and

redisplaying the visualization of the at least some data of the data source based on the contract satisfied by one or both of the revised first intermediate data structure or the revised second intermediate data structure, the redisplayed visualization having the revised graphical object.

10. The method of claim 9, wherein:

the displayed visualization comprises a container visualization that includes a plurality of items organized in a plurality of containers;

the user input comprises removal of a particular item of the plurality of items from a particular container of the plurality of containers; and

revising the particular data of the data source to effect the revision to the graphical object comprises removing a value assigned to the particular container from a record of the particular item that is included in an original data collection of the data source.

11. The method of claim 9, wherein:

the displayed visualization comprises a container visualization that includes a plurality of items organized in a plurality of containers;

the user input comprises renaming a particular container of the plurality of containers from a first container name to a second container name;

the particular container includes one or more of the plurality of items; and

revising the particular data of the data source to effect the revision to the graphical object comprises changing a value assigned to the particular container from the first container name to the second container name in each of one or more records of the one or more of the plurality of items, the one or more records included in an original data collection of the data source.

12. The method of claim 9, wherein following the transform rule of each of the first and second reversible transforms backward to identify the particular data of the data source to revise to effect

the revision to the graphical object comprises following the transform rule of each of the first and second reversible transforms backward to identify how one or more values of the graphical object are generated and where the one or more values come from in the data source.

13. A non-transitory computer-readable storage medium having computer-executable instructions stored thereon that are executable by a processor device to perform or control performance of operations comprising:

applying a first reversible transform to data of a data source to generate a first intermediate data structure without modifying the data of the data source;

applying a second reversible transform to the first intermediate data structure to generate a second intermediate data structure without modifying the data of the data source, wherein at least one of the first intermediate data structure or the second intermediate data structure is in a format suitable to satisfy a contract; and

displaying a visualization of the data of the data source based on the contract satisfied by one or both of the first intermediate data structure or the second intermediate data structure, the displayed visualization having a visualization type specified by the contract.

14. The non-transitory computer-readable storage medium of 13, wherein applying each of the first and second reversible transforms comprises applying at least one of: a field renaming transform, a list unrolling transform, a distinct value transform, a join transform, a union transform, or a filter transform.

15. The non-transitory computer-readable storage medium of claim 13, the operations further comprising:

receiving user input to revise a graphical object in the visualization;

following a transform rule of each of the first and second reversible transforms backward to identify particular data of the data source to revise to effect the revision to the graphical object;

revising the particular data of the data source to effect the revision to the graphical object;

applying the first reversible transform to the revised data of the data source to generate a revised first intermediate data structure;

applying the second reversible transform to the revised first intermediate data structure to generate a revised second intermediate data structure, wherein at least one of the revised first intermediate data structure or the revised second intermediate data structure is in a format suitable to satisfy the contract; and

redisplaying the visualization of the at least some data of the data source based on the contract satisfied by one or both of the revised first intermediate data structure or the revised second intermediate data structure, the redisplayed visualization having the revised graphical object.

16. The non-transitory computer-readable storage medium of claim 15, wherein:

the displayed visualization comprises a container visualization that includes a plurality of items organized in a plurality of containers;

the user input comprises removal of a particular item of the plurality of items from a particular container of the plurality of containers; and

revising the particular data of the data source to effect the revision to the graphical object comprises removing a value assigned to the particular container from a record of the particular item that is included in an original data collection of the data source.

17. The non-transitory computer-readable storage medium of claim 15, wherein:

the displayed visualization comprises a container visualization that includes a plurality of items organized in a plurality of containers;

the user input comprises renaming a particular container of the plurality of containers from a first container name to a second container name;

the particular container includes one or more of the plurality of items; and

revising the particular data of the data source to effect the revision to the graphical object comprises changing a value assigned to the particular container from the first container name to the second container name in each of one or more records of the one or more of the plurality of items, the one or more records included in an original data collection of the data source.

18. The non-transitory computer-readable storage medium of claim 15, wherein following the transform rule of each of the first and second reversible transforms backward to identify the particular data of the data source to revise to effect the revision to the graphical object comprises following the transform rule of each of the first and second reversible transforms backward to identify how one or more values of the graphical object are generated and where the one or more values come from in the data source.