**CodeGenerator**

**Associated Classes**

1. AggregationOperator

2. Alias

3. IntersectionOperator

4. JoinOperator

5. MetaData

6. MetaIndex

7. MetaQuery

8. Operator

9. SelectionOperator

10. SemiJoinOperator

11. ThreadingOperator

**Class Descriptions**

1. AggregationOperator (extends Operator)

A. Member variables:

i. gqFastIndexID(int): The ID in the loader that identifies which index from which to derive the result array domain

ii. dataType (int): A flag that identifies the type of the result array (currently supports 'int' or 'double'

iii. aggregationString (string): A string that contains the aggregation operation to be performed. The operands in the aggregation are designated by 'op0', 'op1', etc., and are offset by spaces to aid in detecting them

iv. aggregationVariablesAliases (List<Integer): A list of Alias's that are the aliases of the 'op0', 'op1', etc.. in the aggregation string

v. aggregationVariablesColumns(List<Integer>): A list of IDs for the columns of the 'op0', 'op1'. This is combines with the alias to identify the element name

vi. drivingAlias (Alias): The alias of the index that drives the 'for' loop above the aggregation

vi. drivingAliasColumn (int): The column within the index that drives the 'for' loop above the aggregation

B. Methods:

i. Constructor (1)

ii. Getters for member variables

2. Alias

A. Member Variables:

i. aliasID (int): An identifier for the alias

ii. alias (String): A string that is the alias name

ii. associatedIndex (MetaIndex): The index metadata of the index associated with the alias

B. Methods:

i. Constructors (2): one constructor does not assign an associatedIndex: when the alias is for a selection, then there is no need for an associated MetaIndex

ii. Getters for member variables

3. IntersectionOperator (extends Operator)

TODO: Implement intersection with IntersectionOperator

4. JoinOperator (extends Operator)

A. Member variables:

i. entityFlag (boolean): true if join is on an entity table, false if on relationship table

ii. columnIDs (List<Integer): A list of the columns which are being decoded in the join

iii. alias (Alias): The Alias associated with the 'output' of the pipelined join

iv.: drivingAlias (Alias): The Alias associated with the 'input' to the pipelined join

v. drivingAliasColumn(int): The column of the driving alias' index which is associated with the 'input' to the pipelined join

B. Methods:

i. Constructor (1)

ii. Getters for member variables

5. MetaData

A. Member variables:

i. indexList (List<MetaIndex): A list of MetaIndex's from which the code generator can draw information

ii. queryList(List<MetaQuery): A list of MetaQuery's which contain information about the queries which code is being generated for

iii. currentQueryID (int): The ID of the query currently being processed

B. Methods:

i. Constructor (1)

ii. Getters for member variables

iii. getMaxIndexID

- returns the largest gqFastIndexID from all the MetaIndex's

iv. getMaxColID

- returns the largest column ID over all the MetaIndex's (used for buffer pool tracking)

6. MetaIndex

A. Member variables:

i. indexID (int): An identifer for the MetaIndex

ii. gqFastIndexID (int): The id for the associated index in the cpp index loader program

iii. numColumns (int) : The number of columns associated with the index

iv. indexMapByteSize (int): The size in bytes of the index map (i.e. lookup structure) of the gq-fast index

v. columnEncodingsList (List<Integer>): A list of the encoding type for each column associated with the index

vi. columnEncodedByteSizesList (List<Integer>): A list of the byte sizes that each of the uncompressed elements of each column of the index takes up

B. Methods:

i. Constructor (1)

ii. Getters for member variables

7. MetaQuery

A. Member variables:

i. queryID (int): An identifier for the MetaQuery

ii. queryName (string): A name for the query, which is used in naming the functions of the generated cpp code

iii. numThreads (int): The number of threads that are to be used in the query processing

iv. bufferPoolSize (int): This should be equal to maximum the number of times any one index appears in the query. Since the buffer arrays are identified by index, multiple instances of an index in the query will require additional buffers

v. aliases (List<Alias>): A list of all the Alias's, which contain information about each alias involved in the query

vi. aliasBufferPoolIDs (int[][]): Keeps track of which buffer pool to use for each index and index column buffer. Of size aliases.size() + 1

vii. preThreading (boolean[]): When multi-threading, this keeps track of whether each alias appears before or after the threading split. Each is assigned during code generation. Of size aliases.size() + 1

B. Methods:

i. Constructor (1)

ii. Getters for queryID, queryName, numThreads, bufferPoolSize, and aliases

iii. getIndexIDs: returns a Set that contains each unique gq-fast index id in the query

iv. initBufferPoolArray: sets the size of each array within the 2-dimensional aliasBufferPoolIDs array

v. getPreThreading: Given an index, retuns preThreading[index]

vi. getBufferPoolID: Given an aliasID and a columnID, returns aliasBufferPoolIDs[aliasID][colID]

vii. setBufferPoolID: Given an aliasID, a columnID and a poolID, sets aliasBufferPoolIDs[aliasID][colID] to poolID

8. Operator (abstract class)

A. Member variables:

i. type (int): The type of operator; one of the subclasses of Operator

B. Methods:

i. Constructor (1)

ii. Getter for type

9. SelectionOperator (extends Operator)

A. Member variables:

i. selectionsList (List<Integer>): A list of IDs that are the selections desired

ii. alias (Alias): The alias associated with the selecitons

B. Methods:

i. Constructor (1)

ii. Getters for member variables

10. SemiJoinOperator (extends Operator)

A. Member variables:

i. entityFlag (boolean): true if semi join is on an entity table, false if on relationship table

ii. columnIDs (List<Integer): A list of the columns which are being decoded in the semi join

iii. alias (Alias): The Alias associated with the 'output' of the pipelined semi-join

iv.: drivingAlias (Alias): The Alias associated with the 'input' to the pipelined semi-join

v. drivingAliasColumn(int): The column of the driving alias' index which is associated with the 'input' to the pipelined semi-join

B. Methods:

i. Constructor (1)

ii. Getters for member variables

11. ThreadingOperator (extends Operator)

A. Member variables:

i. drivingAlias (Alias): the alias for the index which drives the loop following threading

B. Methods:

i. Constructor (1)

ii. Getter for member variable