```
SQL statement
explain Explain clause
   - explain false
   - query plan false
core Select core select
       type not specified
       - columns Result column list size 1
        item Result column expression
            — expression Function call
               - name Identifier quotation none identifier sum
               — parameters Function params expr list distinct false

    □ parameters Expression list size 1

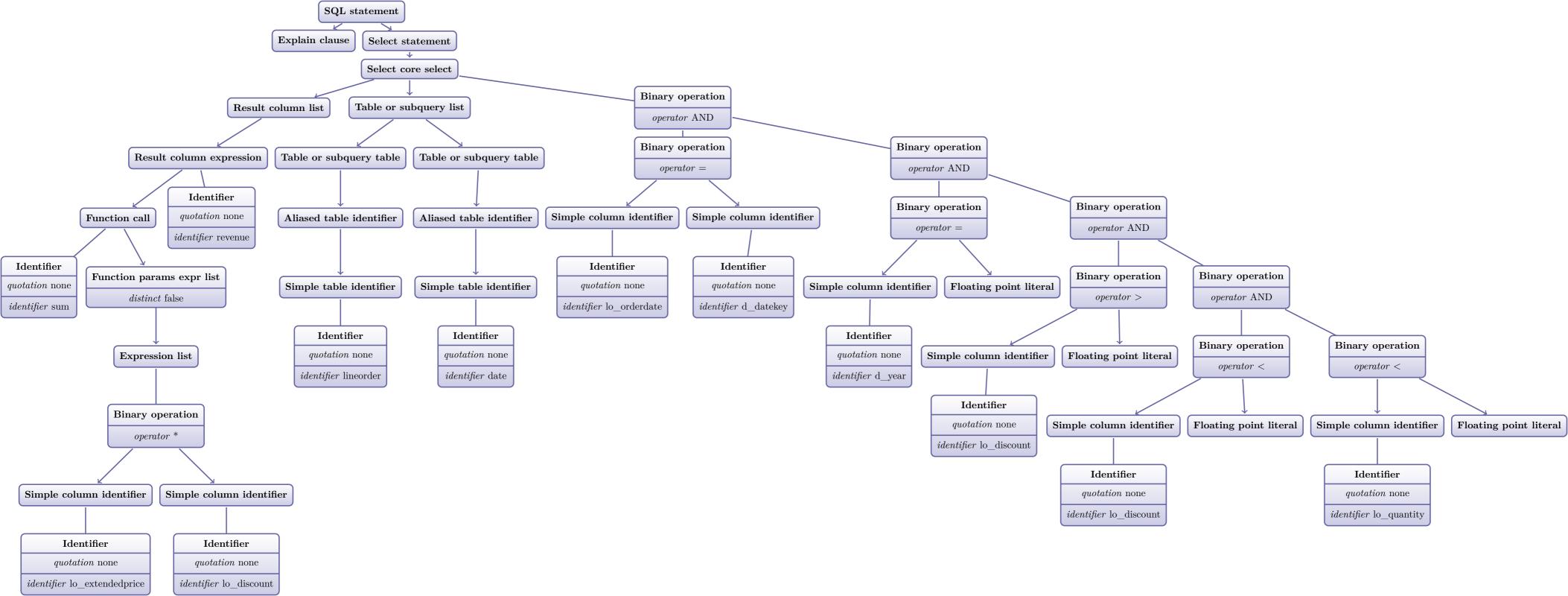
                    item Binary operation operator *

    first Simple column identifier

                         column Identifier quotation none identifier lo_extendedprice
                       second Simple column identifier
                         L column Identifier quotation none identifier lo_discount
             - alias Identifier quotation none identifier revenue
       - from Table or subquery list size 2
          - item Table or subquery table
            table Aliased table identifier
               table Simple table identifier
                 Lable Identifier quotation none identifier lineorder

    alias undefined

            \perp index not specified
         — item Table or subquery table
             - table Aliased table identifier
               table Simple table identifier
                 table Identifier quotation none identifier date
               \vdash alias undefined
            index not specified
       - where Binary operation operator AND
          - first Binary operation operator =
           - first Simple column identifier
              column Identifier quotation none identifier lo_orderdate
            second Simple column identifier
              column Identifier quotation none identifier d_datekey
         second Binary operation operator AND
           first Binary operation operator =
               first Simple column identifier
                 Lolumn Identifier quotation none identifier d_year
              second Floating point literal
                 - literal 1993.000000
           second Binary operation operator AND
                - first Binary operation operator >
                 first Simple column identifier
                   column Identifier quotation none identifier lo_discount
                  - second Floating point literal
                    └─ literal 1.000000
              second Binary operation operator AND
                  - first Binary operation operator <</pre>
                    first Simple column identifier
                       column Identifier quotation none identifier lo_discount
                    second Floating point literal
                       - literal 3.000000
                  second Binary operation operator <</p>
                     - first Simple column identifier
                      - column Identifier quotation none identifier lo_quantity
                     - second Floating point literal
                       - literal 25.000000
       grouping undefined
```



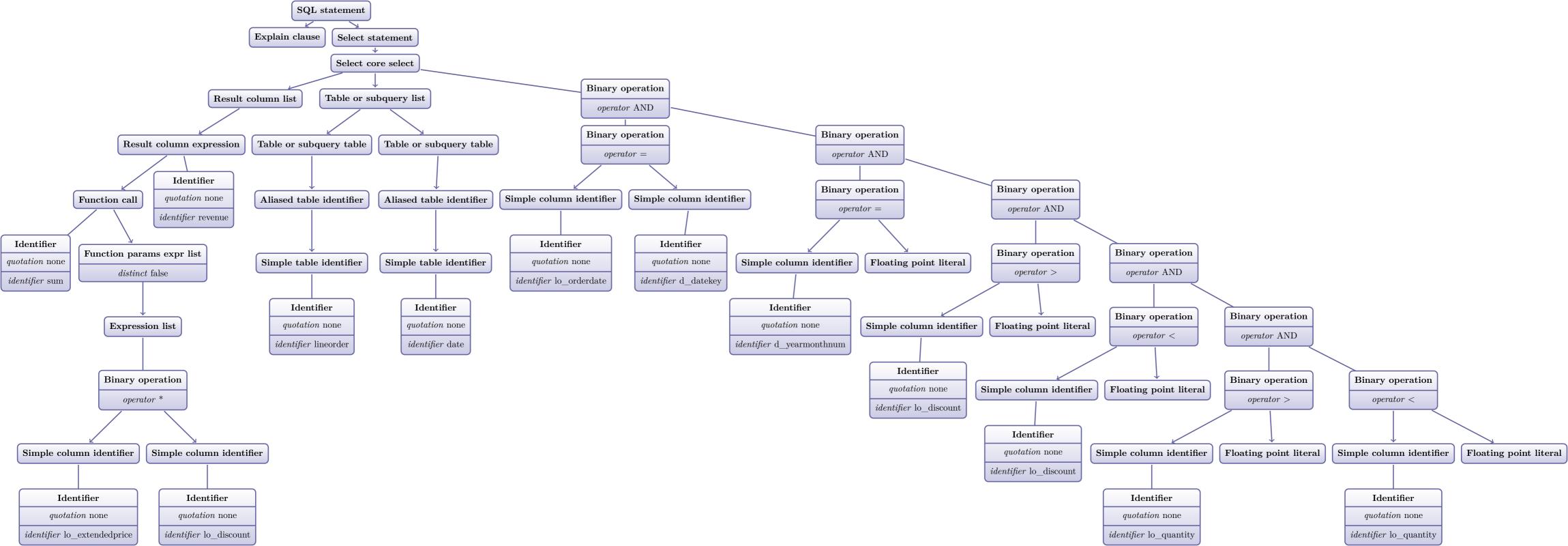
```
SQL statement
explain Explain clause
   - explain false
   - query plan false
core Select core select
      type not specified
       - columns Result column list size 1
        item Result column expression
            — expression Function call
               - name Identifier quotation none identifier sum
               - parameters Function params expr list distinct false
                parameters Expression list size 1
                   item Binary operation operator *

    first Simple column identifier

                         column Identifier quotation none identifier lo_extendedprice
                      second Simple column identifier
                         L column Identifier quotation none identifier lo_discount
            - alias Identifier quotation none identifier revenue
       - from Table or subquery list size 2
         - item Table or subquery table
           table Aliased table identifier
              table Simple table identifier
                table Identifier quotation none identifier lineorder

    alias undefined

            — index not specified
         — item Table or subquery table
            - table Aliased table identifier
              - table Simple table identifier
                table Identifier quotation none identifier date
              - alias undefined
            index not specified
       - where Binary operation operator AND
         - first Binary operation operator =
           - first Simple column identifier
              column Identifier quotation none identifier lo_orderdate
           second Simple column identifier
              column Identifier quotation none identifier d_datekey
        second Binary operation operator AND
           first Binary operation operator =
               first Simple column identifier
                column Identifier quotation none identifier d_yearmonthnum
              second Floating point literal
                - literal 199401.000000
           second Binary operation operator AND
               - first Binary operation operator >
                first Simple column identifier
                   column Identifier quotation none identifier lo_discount
                  - second Floating point literal
                   └─ literal 4.000000
              second Binary operation operator AND
                  - first Binary operation operator <</pre>
                   first Simple column identifier
                      column Identifier quotation none identifier lo_discount
                   second Floating point literal
                      - literal 6.000000
                  second Binary operation operator AND
                    - first Binary operation operator >
                      first Simple column identifier
                         column Identifier quotation none identifier lo_quantity
                      - literal 26.000000
                    - second Binary operation operator <</pre>
                       - first Simple column identifier
                         column Identifier quotation none identifier lo_quantity
                      - literal 35.000000
      grouping undefined
```



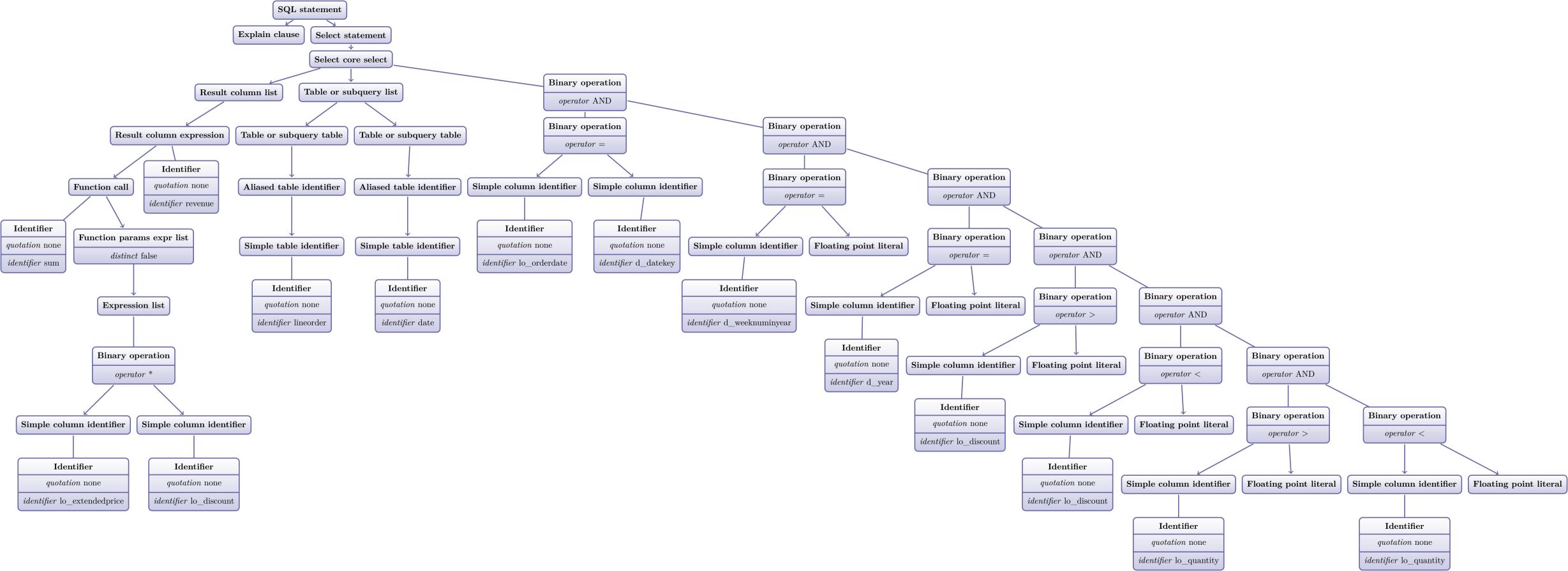
```
SQL statement
explain Explain clause
   - explain false
   - query plan false
 — stmt Select statement
   core Select core select
       type not specified
       - columns Result column list size 1
        item Result column expression
            expression Function call
               - name Identifier quotation none identifier sum
               — parameters Function params expr list distinct false

    □ parameters Expression list size 1

                    item Binary operation operator *
                       first Simple column identifier
                         column Identifier quotation none identifier lo_extendedprice
                       second Simple column identifier
                         column Identifier quotation none identifier lo_discount
             - alias Identifier quotation none identifier revenue
       - from Table or subquery list size 2
          item Table or subquery table
            table Aliased table identifier
               table Simple table identifier
                 table Identifier quotation none identifier lineorder
              - alias undefined
            index not specified
         item Table or subquery table
            - table Aliased table identifier
              - table Simple table identifier
                 Lable Identifier quotation none identifier date
               ⊢ alias undefined
            index not specified
       — where Binary operation operator AND
          - first Binary operation operator =

    first Simple column identifier

              column Identifier quotation none identifier lo_orderdate
           second Simple column identifier
              column Identifier quotation none identifier d_datekey
         second Binary operation operator AND
           first Binary operation operator =
               first Simple column identifier
                 L column Identifier quotation none identifier d_weeknuminyear
              second Floating point literal
                 - literal 6.000000
            second Binary operation operator AND
               first Binary operation operator =
                 first Simple column identifier
                   column Identifier quotation none identifier d_ye
                  - second Floating point literal
                    - literal 1994.000000
              second Binary operation operator AND
                  - first Binary operation operator >
                     first Simple column identifier
                       column Identifier quotation none identifier lo_discount
                    second Floating point literal
                       - literal 5.000000
                  - second Binary operation operator AND
                     - first Binary operation operator <</pre>
                        first Simple column identifier
                         column Identifier quotation none identifier lo_discount
                       - second Floating point literal
                         └─ literal 7.000000
                     second Binary operation operator AND
                        - first Binary operation operator >
                          first Simple column identifier
                            L column Identifier quotation none identifier lo_quantity
                          - second Floating point literal
                            - literal 26.000000
                        second Binary operation operator <</p>
                          first Simple column identifier
                            column Identifier quotation none identifier lo_quantity
                           - second Floating point literal
                            - literal 35.000000
        grouping undefined
```



```
- explain Explain clause
  explain false
  query plan false
- stmt Select statement
  core Select core select
      - type not specified
      -columns Result column list size 3
         - item Result column expression
           expression Function call
              - name Identifier quotation none identifier sum
              - parameters Function params expr list distinct false
                parameters Expression list size 1
                   item Simple column identifier
                      column Identifier quotation none identifier lo_revenue
           — alias undefined
         - item Result column expression
           - expression Simple column identifier
             column Identifier quotation none identifier d_year
          - alias undefined
        - item Result column expression
           - expression Simple column identifier
             column Identifier quotation none identifier p_brand1
           - alias undefined
      - from Table or subquery list size 4\,
         - item Table or subquery table
           - table Aliased table identifier
              - table Simple table identifier
                Lable Identifier quotation none identifier lineorder

    alias undefined

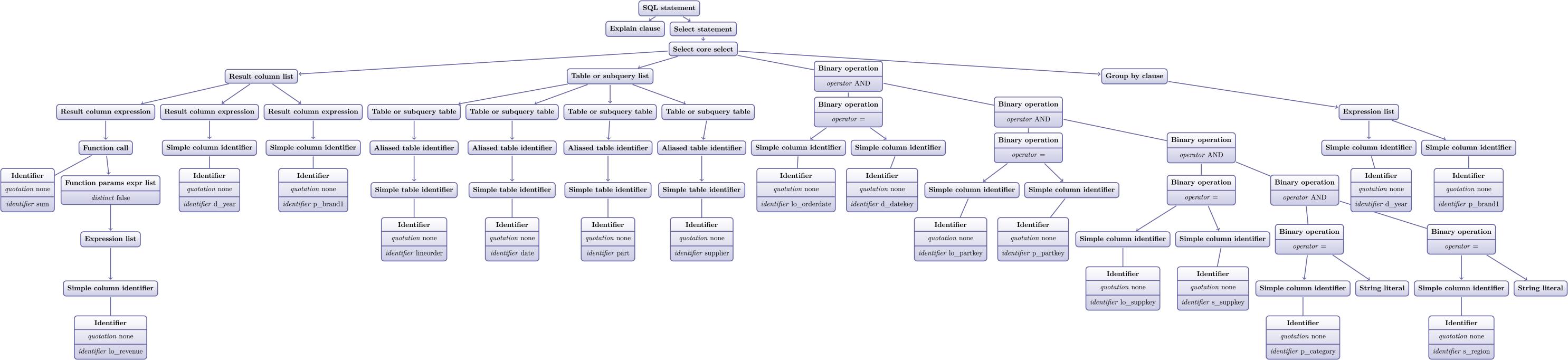
          index not specified
         - item Table or subquery table
            table Aliased table identifier
             - table Simple table identifier
                table Identifier quotation none identifier date
              - alias undefined
          index not specified

    item Table or subquery table

            - table Aliased table identifier
               - table Simple table identifier
                table Identifier quotation none identifier part
              - alias undefined
          index not specified
         - item Table or subquery table
            - table Aliased table identifier
              - table Simple table identifier
                table Identifier quotation none identifier supplier
             alias undefined
          index not specified
      - where Binary operation operator AND
         first Binary operation operator =
          first Simple column identifier
             column Identifier quotation none identifier lo_orderdate
           - second Simple column identifier
             column Identifier quotation none identifier d_datekey
         - second Binary operation operator AND
           - first Binary operation operator =
               - first Simple column identifier
                column Identifier quotation none identifier lo_partkey
             second Simple column identifier
                column Identifier quotation none identifier p_partkey
           second Binary operation operator AND
              - first Binary operation operator =
                 - first Simple column identifier
                   column Identifier quotation none identifier lo_suppkey
                 - second Simple column identifier
                   column Identifier quotation none identifier s_suppkey
             ldsymbol{f oxedsymbol{f f eta}} second Binary operation operator AND
                 - first Binary operation operator =
                    first Simple column identifier
                      column Identifier quotation none identifier p_category
                   second String literal
                       quotation single
                       -literal MFGR#12
                 - second Binary operation operator =
                    - first Simple column identifier

    □ column Identifier quotation none identifier s_region

                   - quotation single
                       - literal AMERICA
      grouping Group by clause
        - by Expression list size 2
            - item Simple column identifier
             column Identifier quotation none identifier d_year
          _ item Simple column identifier
             column Identifier quotation none identifier p_brand1
         - having undefined
```



```
SQL statement
 - explain Explain clause
   explain false
   query plan false
 - stmt Select statement
   core Select core select
       type not specified
       - columns Result column list size 3
          - item Result column expression
             expression Function call
                - name Identifier quotation none identifier sum
                - parameters Function params expr list distinct false

    □ parameters Expression list size 1

                    item Simple column identifier
                       column Identifier quotation none identifier lo_revenue

    alias undefined

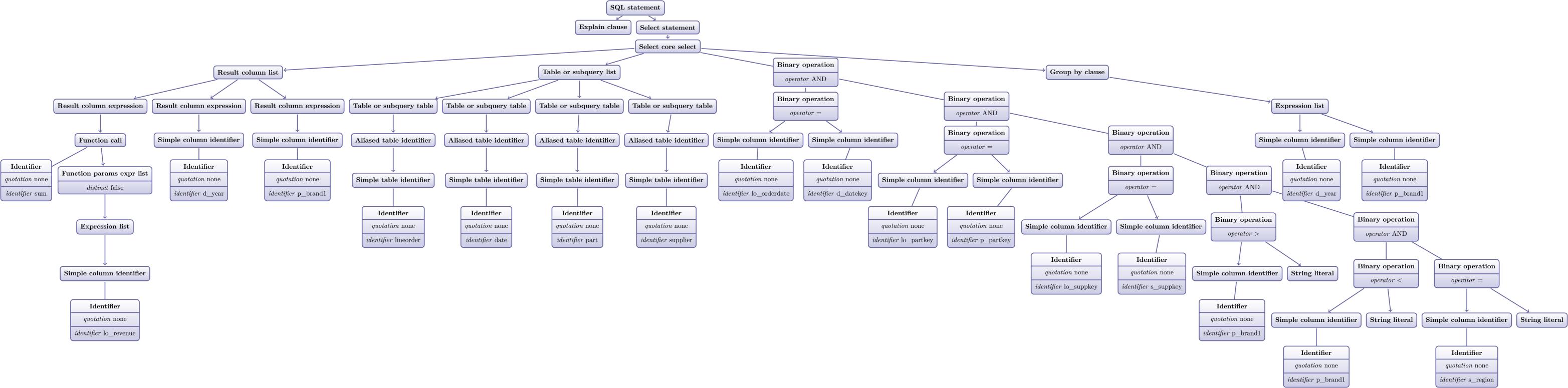
          - item Result column expression
             - expression Simple column identifier
               column Identifier quotation none identifier d_year
            - alias undefined
          item Result column expression
             - expression Simple column identifier
              column Identifier quotation none identifier p_brand1
             - alias undefined
       -from Table or subquery list size 4
          - item Table or subquery table
             - table Aliased table identifier
                - table Simple table identifier
                 table Identifier quotation none identifier lineorder
               alias undefined
             - index not specified
          - item Table or subquery table
             table Aliased table identifier
               table Simple table identifier
                 Lable Identifier quotation none identifier date
                - alias undefined
            index not specified

    item Table or subquery table

             table Aliased table identifier
                - table Simple table identifier
                 table Identifier quotation none identifier part

    alias undefined

            index not specified
          - item Table or subquery table
             - table Aliased table identifier
                - table Simple table identifier
                 table Identifier quotation none identifier supplier
              alias undefined
             - index not specified
       - where Binary operation operator AND
          - first Binary operation operator =
            first Simple column identifier
              column Identifier quotation none identifier lo_orderdate
             - second Simple column identifier
              column Identifier quotation none identifier d_datekey
          - second Binary operation operator AND
             - first Binary operation operator =
                first Simple column identifier
                 column Identifier quotation none identifier lo_partkey
               second Simple column identifier
                 column Identifier quotation none identifier p_partkey
             - second Binary operation operator AND
                - first Binary operation operator =
                  - first Simple column identifier
                    column Identifier quotation none identifier lo_suppkey
                  second Simple column identifier
                    column Identifier quotation none identifier s_suppkey
               second Binary operation operator AND
                   - first Binary operation operator >
                      - first Simple column identifier
                       column Identifier quotation none identifier p_brand1
                    second String literal
                        - quotation single
                        -literal MFGR#2221
                   second Binary operation operator AND
                     - first Binary operation operator <</pre>
                       first Simple column identifier
                          column Identifier quotation none identifier p_brand1
                       second String literal
                           - quotation single
                           - literal MFGR#2228
                      - second Binary operation operator =
                        first Simple column identifier
                          column Identifier quotation none identifier s region
                       second String literal
                           — quotation single
                           -literal ASIA
      ldsymbol{oxdath} grouping Group by clause
          - by Expression list size 2
             - item Simple column identifier
              column Identifier quotation none identifier d_year
             item Simple column identifier
              column Identifier quotation none identifier p_brand1
          - having undefined
```



```
- explain Explain clause
  explain false
  query plan false
- stmt Select statement
  core Select core select
      - type not specified
      -columns Result column list size 3
         - item Result column expression
           expression Function call
              - name Identifier quotation none identifier sum
              - parameters Function params expr list distinct false
                parameters Expression list size 1
                   item Simple column identifier
                      column Identifier quotation none identifier lo_revenue
           — alias undefined
         - item Result column expression
           - expression Simple column identifier
             column Identifier quotation none identifier d_year
          - alias undefined
        - item Result column expression
           - expression Simple column identifier
             column Identifier quotation none identifier p_brand1
           - alias undefined
      - from Table or subquery list size 4\,
         - item Table or subquery table
           - table Aliased table identifier
              - table Simple table identifier
                Lable Identifier quotation none identifier lineorder

    alias undefined

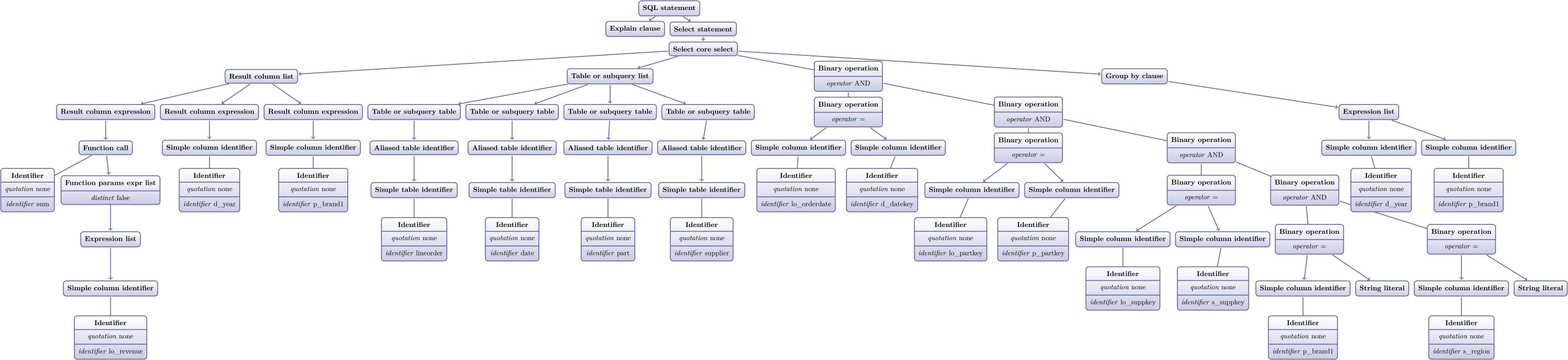
          index not specified
         - item Table or subquery table
            table Aliased table identifier
             - table Simple table identifier
                table Identifier quotation none identifier date
              - alias undefined
          index not specified

    item Table or subquery table

            - table Aliased table identifier
               - table Simple table identifier
                table Identifier quotation none identifier part
              - alias undefined
          index not specified
         - item Table or subquery table
            - table Aliased table identifier
              - table Simple table identifier
                table Identifier quotation none identifier supplier
             alias undefined
          index not specified
      - where Binary operation operator AND
         first Binary operation operator =
          first Simple column identifier
             column Identifier quotation none identifier lo_orderdate
           - second Simple column identifier
             column Identifier quotation none identifier d_datekey
         - second Binary operation operator AND
           - first Binary operation operator =
               - first Simple column identifier
                column Identifier quotation none identifier lo_partkey
             second Simple column identifier
                column Identifier quotation none identifier p_partkey
           second Binary operation operator AND
              - first Binary operation operator =
                 - first Simple column identifier
                   column Identifier quotation none identifier lo_suppkey
                 - second Simple column identifier
                   column Identifier quotation none identifier s_suppkey
             ldsymbol{f oxedsymbol{f f eta}} second Binary operation operator AND
                 - first Binary operation operator =
                    - first Simple column identifier
                      column Identifier quotation none identifier p_brand1
                   second String literal
                       quotation single
                       -literal MFGR#2221
                 - second Binary operation operator =
                    - first Simple column identifier

    □ column Identifier quotation none identifier s_region

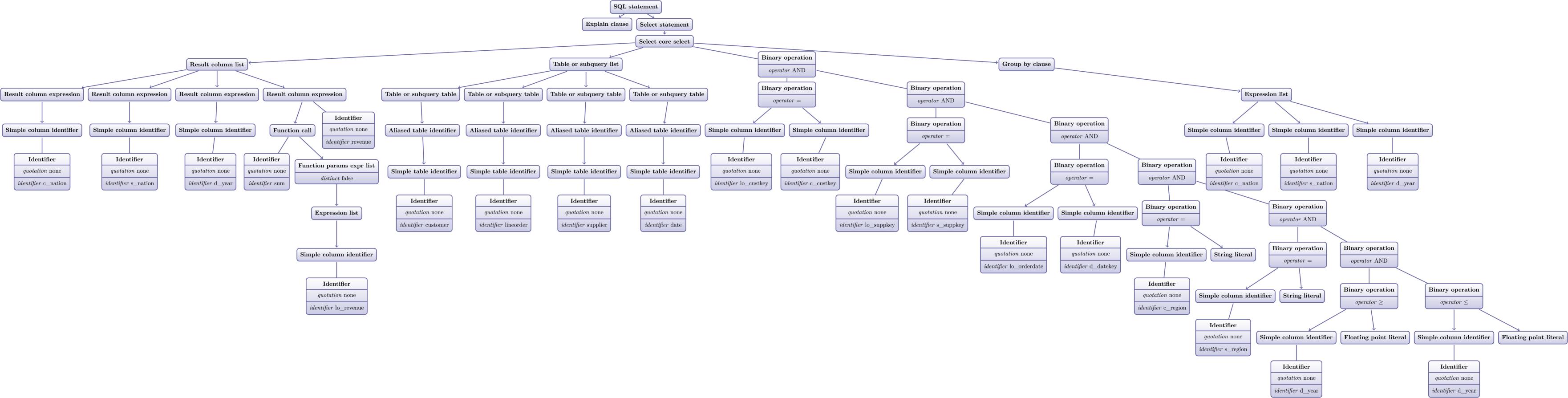
                   - quotation single
                       - literal EUROPE
      grouping Group by clause
        - by Expression list size 2
            - item Simple column identifier
             column Identifier quotation none identifier d_year
          item Simple column identifier
             column Identifier quotation none identifier p_brand1
         - having undefined
```



```
- explain Explain clause
 explain false
 query plan false
- stmt Select statement
 core Select core select
     - type not specified
      columns Result column list size 4
        - item Result column expression
          expression Simple column identifier
            column Identifier quotation none identifier c_nation
           - alias undefined
       item Result column expression
           - expression Simple column identifier
            column Identifier quotation none identifier s_nation
          - alias undefined
        - item Result column expression
           - expression Simple column identifier
            column Identifier quotation none identifier d_year
          - alias undefined
       item Result column expression
           - expression Function call
             name Identifier quotation none identifier sum
             parameters Function params expr list distinct false
               parameters Expression list size 1
                  item Simple column identifier
                     column Identifier quotation none identifier lo_revenue
          alias Identifier quotation none identifier revenue
      -from Table or subquery list size 4
        - item Table or subquery table
           - table Aliased table identifier
              - table Simple table identifier
               table Identifier quotation none identifier customer
              alias undefined
          index not specified

    item Table or subquery table

           table Aliased table identifier
              - table Simple table identifier
               table Identifier quotation none identifier lineorder
             - alias undefined
          index not specified
        - item Table or subquery table
           - table Aliased table identifier
             table Simple table identifier
               table Identifier quotation none identifier supplier
              alias undefined
           - index not specified
       item Table or subquery table
           table Aliased table identifier
              - table Simple table identifier
               table Identifier quotation none identifier date
              - alias undefined
          index not specified
      where Binary operation operator AND
       first Binary operation operator =
           - first Simple column identifier
            column Identifier quotation none identifier lo_custkey
          column Identifier quotation none identifier c_custkey
        - second Binary operation operator AND
           - first Binary operation operator =
             first Simple column identifier
               column Identifier quotation none identifier lo_suppkey
             - second Simple column identifier
               column Identifier quotation none identifier s_suppkey
           - second Binary operation operator AND
              - first Binary operation operator =
                 - first Simple column identifier
                  column Identifier quotation none identifier lo_orderdate
                - second Simple column identifier
                  column Identifier quotation none identifier d_datekey
              - second Binary operation operator AND
                - first Binary operation operator =
                   - first Simple column identifier
                     L column Identifier quotation none identifier c_region
                  - quotation single
                     └─ literal ASIA
               second Binary operation operator AND
                  first Binary operation operator =
                     first Simple column identifier
                        column Identifier quotation none identifier s_region
                     second String literal
                         - quotation single
                        └─ literal ASIA
                   - second Binary operation operator AND
                      - first Binary operation operator >=
                         first Simple column identifier
                          column Identifier quotation none identifier d_year
                        second Floating point literal
                          - second Binary operation operator <=</pre>
                         - first Simple column identifier
                          column Identifier quotation none identifier d_year
                        second Floating point literal
                          - literal 1997.000000
    grouping Group by clause
        - by Expression list size 3
          item Simple column identifier
            Lolumn Identifier quotation none identifier c_nation
           - item Simple column identifier
            column Identifier quotation none identifier s_nation
          item Simple column identifier
            column Identifier quotation none identifier d_year
```



```
- explain Explain clause
 explain false
 query plan false
- stmt Select statement
 core Select core select
     - type not specified
      columns Result column list size 4
        - item Result column expression
          expression Simple column identifier
             column Identifier quotation none identifier c_city
           - alias undefined
       item Result column expression
           - expression Simple column identifier
             column Identifier quotation none identifier s_city
          - alias undefined
        - item Result column expression
           - expression Simple column identifier
             column Identifier quotation none identifier d_year
          - alias undefined
       item Result column expression
           - expression Function call
             name Identifier quotation none identifier sum
             parameters Function params expr list distinct false
               parameters Expression list size 1
                  item Simple column identifier
                     column Identifier quotation none identifier lo_revenue
          alias Identifier quotation none identifier revenue
      -from Table or subquery list size 4
        - item Table or subquery table
           - table Aliased table identifier
              - table Simple table identifier
               table Identifier quotation none identifier customer
              alias undefined
          index not specified

    item Table or subquery table

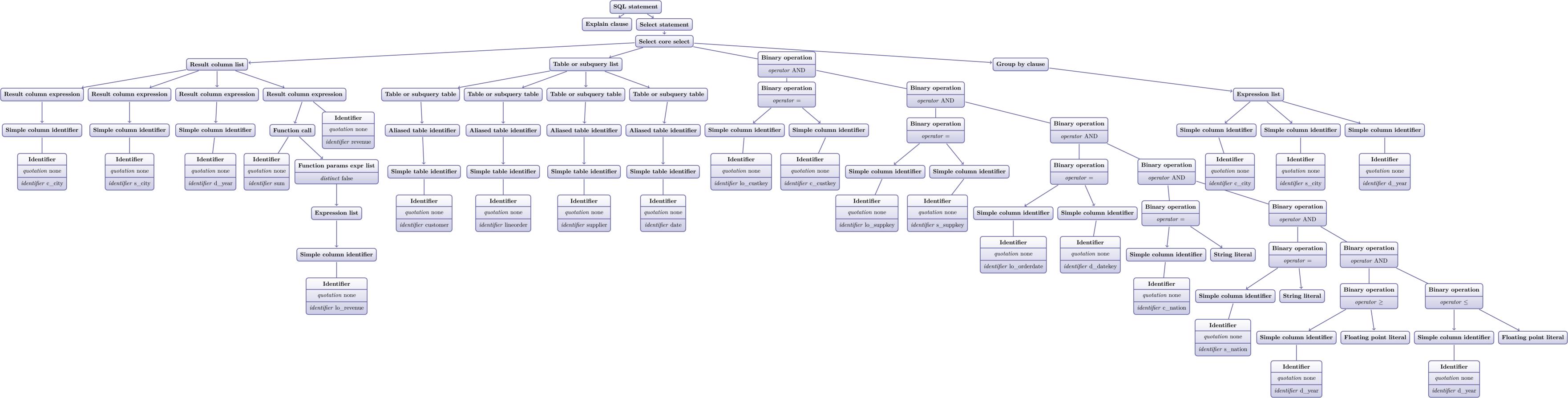
           table Aliased table identifier
              - table Simple table identifier
               table Identifier quotation none identifier lineorder
             - alias undefined
          index not specified
        - item Table or subquery table
           - table Aliased table identifier
             table Simple table identifier
               table Identifier quotation none identifier supplier
              - alias undefined
           - index not specified
       item Table or subquery table
           table Aliased table identifier
              - table Simple table identifier
               table Identifier quotation none identifier date
              - alias undefined
          index not specified
      where Binary operation operator AND
       first Binary operation operator =
           - first Simple column identifier
             column Identifier quotation none identifier lo_custkey
          column Identifier quotation none identifier c_custkey
        - second Binary operation operator AND
           - first Binary operation operator =
              first Simple column identifier
               column Identifier quotation none identifier lo_suppkey
              - second Simple column identifier
               column Identifier quotation none identifier s_suppkey
           - second Binary operation operator AND
              - first Binary operation operator =
                 - first Simple column identifier
                  column Identifier quotation none identifier lo_orderdate
                - second Simple column identifier
                  column Identifier quotation none identifier d_datekey
              - second Binary operation operator AND
                - first Binary operation operator =
                   - first Simple column identifier

    □ column Identifier quotation none identifier c_nation

                  quotation single
                     └─ literal UNITEDSTATES
               second Binary operation operator AND
                  first Binary operation operator =
                     first Simple column identifier

    □ column Identifier quotation none identifier s_nation

                     second String literal
                         - quotation single
                         - literal UNITEDSTATES
                    - second Binary operation operator AND
                      - first Binary operation operator >=
                         first Simple column identifier
                          column Identifier quotation none identifier d_year
                         second Floating point literal
                          - second Binary operation operator <=</pre>
                         - first Simple column identifier
                          L column Identifier quotation none identifier d_year
                        second Floating point literal
                          └─ literal 1997.000000
    grouping Group by clause
        - by Expression list size 3
          item Simple column identifier
             column Identifier quotation none identifier c_city
           - item Simple column identifier
            L column Identifier quotation none identifier s_city
          item Simple column identifier
             column Identifier quotation none identifier d_year
```



```
SQL statement
 - explain Explain clause
   explain false
   query plan false
 - stmt Select statement
   core Select core select
       - type not specified
       columns Result column list size 4
          - item Result column expression
           expression Simple column identifier
              column Identifier quotation none identifier c_city
            - alias undefined
         - item Result column expression
             - expression Simple column identifier
              column Identifier quotation none identifier s_city
           - alias undefined
          - item Result column expression
            - expression Simple column identifier
              column Identifier quotation none identifier d_year
           - alias undefined
        item Result column expression
             - expression Function call
               - name Identifier quotation none identifier sum
              parameters Function params expr list distinct false
                 parameters Expression list size 1
                    item Simple column identifier
                       column Identifier quotation none identifier lo_revenue
           - alias Identifier quotation none identifier revenue
       -from Table or subquery list size 4
          - item Table or subquery table
             - table Aliased table identifier
               table Simple table identifier
                 table Identifier quotation none identifier customer
                alias undefined
           index not specified

    item Table or subquery table

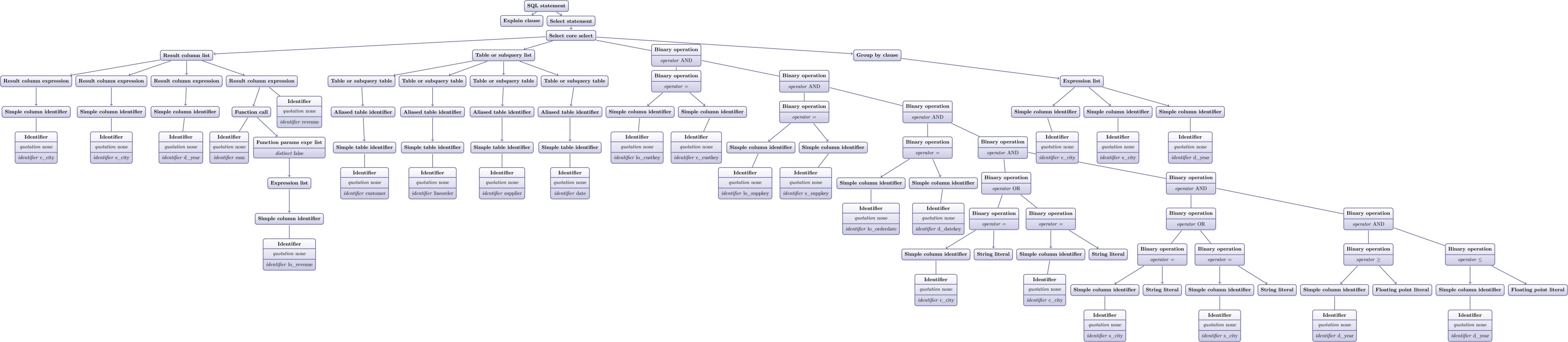
             table Aliased table identifier
               - table Simple table identifier
                 table Identifier quotation none identifier lineorder
              - alias undefined
           index not specified
          - item Table or subquery table
             - table Aliased table identifier
               - table Simple table identifier
                 table Identifier quotation none identifier supplier
                - alias undefined
             - index not specified
        item Table or subquery table
             - table Aliased table identifier
               - table Simple table identifier
                 Lable Identifier quotation none identifier date
                alias undefined
           index not specified
       - where Binary operation operator AND
         - first Binary operation operator =
             first Simple column identifier
              column Identifier quotation none identifier lo_custkey
           second Simple column identifier
              column Identifier quotation none identifier c_custkey
          - second Binary operation operator AND
             - first Binary operation operator =
              first Simple column identifier
                 column Identifier quotation none identifier lo_suppkey
              second Simple column identifier
                 column Identifier quotation none identifier s_suppkey
            second Binary operation operator AND
                - first Binary operation operator =
                  first Simple column identifier
                    column Identifier quotation none identifier lo_orderdate
                 second Simple column identifier
                    column Identifier quotation none identifier d_datekey
                - second Binary operation operator AND
                  - first Binary operation operator OR
                     - first Binary operation operator =
                        - first Simple column identifier
                         column Identifier quotation none identifier c_city
                       - quotation single
                           - literal UNITEDKI1
                     - second Binary operation operator =
                        - first Simple column identifier
                         column Identifier quotation none identifier c_city
                       - quotation single
                           - literal UNITEDKI5
                  - second Binary operation operator AND
                     - first Binary operation operator OR
                        - first Binary operation operator =
                          first Simple column identifier
                            column Identifier quotation none identifier s_city
                         second String literal
                            quotation single
                            - literal UNITEDKI1
                       — second Binary operation operator =

    first Simple column identifier

                            column Identifier quotation none identifier s_city
                           second String literal
                             — quotation single
                              -literal UNITEDKI5
                     - second Binary operation operator AND
                        - first Binary operation operator >=
                          first Simple column identifier
                            column Identifier quotation none identifier d_year
                          - second Floating point literal
                            - literal 1992.000000
                       — second Binary operation operator <=</p>
                          first Simple column identifier
                            column Identifier quotation none identifier d_year
                          - second Floating point literal
                            - literal 1997.000000
       grouping Group by clause
         by Expression list size 3
             - item Simple column identifier
              column Identifier quotation none identifier c_city

    item Simple column identifier

              Le column Identifier quotation none identifier s_city
           item Simple column identifier
              column Identifier quotation none identifier d_year
          having undefined
```



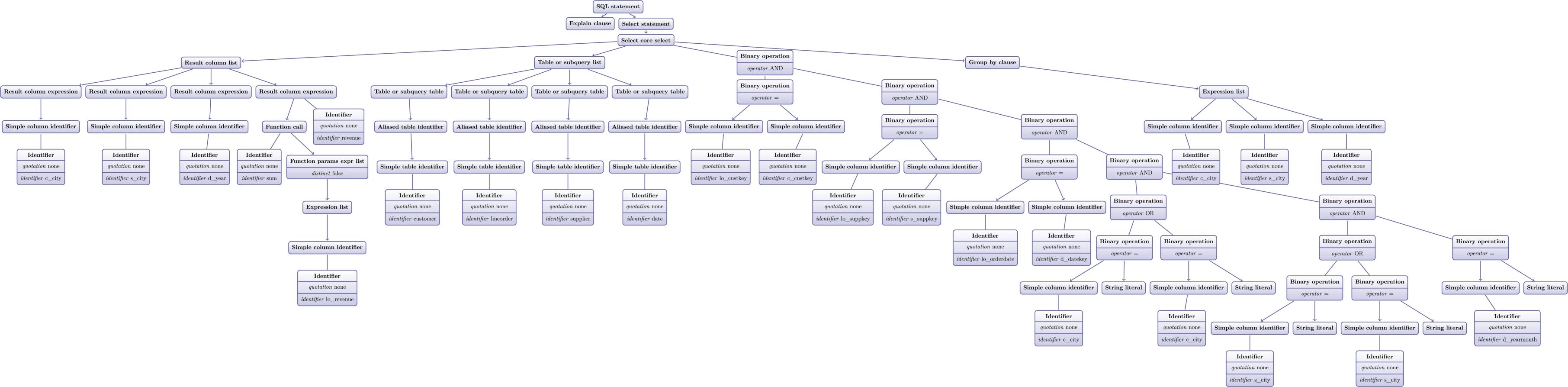
```
SQL statement
 - explain Explain clause
   explain false
   query plan false
stmt Select statement
   core Select core select
       type not specified
       - columns Result column list size 4
          - item Result column expression
            - expression Simple column identifier
              column Identifier quotation none identifier c_city
            - alias undefined
         item Result column expression
             - expression Simple column identifier
              column Identifier quotation none identifier s_city
           - alias undefined
          item Result column expression
             - expression Simple column identifier
              column Identifier quotation none identifier d_year

    alias undefined

         item Result column expression
             - expression Function call
               - name Identifier quotation none identifier sum
              parameters Function params expr list distinct false
                 parameters Expression list size 1
                    item Simple column identifier
                       column Identifier quotation none identifier lo_revenue
           alias Identifier quotation none identifier revenue
       - from Table or subquery list size 4
         item Table or subquery table
             - table Aliased table identifier
               — table Simple table identifier
                 table Identifier quotation none identifier customer
               - alias undefined
           index not specified

    item Table or subquery table

             - table Aliased table identifier
               - table Simple table identifier
                 table Identifier quotation none identifier lineorder
              - alias undefined
           index not specified
          - item Table or subquery table
             - table Aliased table identifier
               table Simple table identifier
                 table Identifier quotation none identifier supplier
               - alias undefined
             - index not specified
        item Table or subquery table
             table Aliased table identifier
               - table Simple table identifier
                 table Identifier quotation none identifier date
               - alias undefined
           index not specified
       - where Binary operation operator AND
         - first Binary operation operator =
             - first Simple column identifier
              column Identifier quotation none identifier lo_custkey
           second Simple column identifier
              column Identifier quotation none identifier c_custkey
         second Binary operation operator AND
            - first Binary operation operator =
              first Simple column identifier
                 column Identifier quotation none identifier lo_suppkey
               second Simple column identifier
                 column Identifier quotation none identifier s_suppkey
             - second Binary operation operator AND
               - first Binary operation operator =
                  - first Simple column identifier
                    column Identifier quotation none identifier lo_orderdate
                  - second Simple column identifier
                    column Identifier quotation none identifier d_datekey
                second Binary operation operator AND
                  - first Binary operation operator OR
                     - first Binary operation operator =
                        first Simple column identifier
                         column Identifier quotation none identifier c_city
                        second String literal
                           - quotation single
                           - literal UNITEDKI1
                    second Binary operation operator =
                        first Simple column identifier
                         column Identifier quotation none identifier c_city
                       - quotation single
                           - literal UNITEDKI5
                  - second Binary operation operator AND
                     -first Binary operation operator OR
                        - first Binary operation operator =
                           first Simple column identifier
                            column Identifier quotation none identifier s_city
                          second String literal
                            quotation single
                            literal UNITEDKI1
                        - second Binary operation operator =
                           first Simple column identifier
                            column Identifier quotation none identifier s_city
                           second String literal
                            quotation single
                              -literal UNITEDKI5
                     second Binary operation operator =
                        - first Simple column identifier
                         column Identifier quotation none identifier d_yearmonth
                        second String literal
                           - quotation single
                           -literal Dec1997
      grouping Group by clause
          - by Expression list size 3
            - item Simple column identifier
              column Identifier quotation none identifier c_city
             - item Simple column identifier
              column Identifier quotation none identifier s_city
            item Simple column identifier
              column Identifier quotation none identifier d_year
```



```
SQL statement
 - explain Explain clause
   explain false
   - query plan false
 — stmt Select statement
   core Select core select
      type not specified
       - columns Result column list size 3
         item Result column expression
           expression Simple column identifier
              column Identifier quotation none identifier d_year

    alias undefined

         item Result column expression
            - expression Simple column identifier
              column Identifier quotation none identifier c_nation
           - alias undefined
         — item Result column expression
            expression Function call
               - name Identifier quotation none identifier sum
               - parameters Function params expr list distinct false

    □ parameters Expression list size 1

                    item Binary operation operator -
                        - first Simple column identifier
                          column Identifier quotation none identifier lo_revenue
                       second Simple column identifier
                         - column Identifier quotation none identifier lo_supplycost
            - alias Identifier quotation none identifier profit
       from Table or subquery list size 5
          - item Table or subquery table

    table Aliased table identifier

                - table Simple table identifier
                 Lable Identifier quotation none identifier date
              - alias undefined
           index not specified
          item Table or subquery table
            - table Aliased table identifier
               — table Simple table identifier
                 Lable Identifier quotation none identifier customer
               - alias undefined
           index not specified

    item Table or subquery table

    table Aliased table identifier

               - table Simple table identifier
                 table Identifier quotation none identifier supplier
              - alias undefined
           index not specified
          - item Table or subquery table
             - table Aliased table identifier
               table Simple table identifier
                 table Identifier quotation none identifier part
              - alias undefined
           index not specified
        - item Table or subquery table
             - table Aliased table identifier
               table Simple table identifier
                 table Identifier quotation none identifier lineorder
               - alias undefined
           index not specified
       - where Binary operation operator AND
        first Binary operation operator =
            - first Simple column identifier
              column Identifier quotation none identifier lo_custkey
           second Simple column identifier
              column Identifier quotation none identifier c_custkey
         second Binary operation operator AND
            - first Binary operation operator =
               first Simple column identifier
                 column Identifier quotation none identifier lo_suppkey

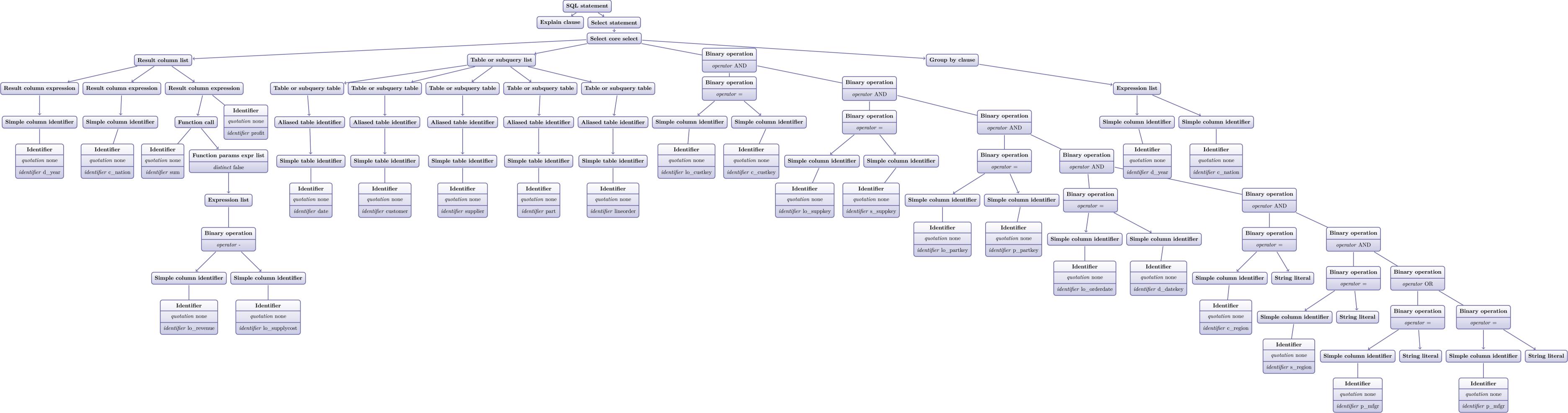
    second Simple column identifier

                 column Identifier quotation none identifier s_suppkey
           second Binary operation operator AND
               - first Binary operation operator =
                 first Simple column identifier
                    column Identifier quotation none identifier lo_partkey
                 second Simple column identifier
                    column Identifier quotation none identifier p_partkey
               second Binary operation operator AND
                 first Binary operation operator =
                     - first Simple column identifier
                       column Identifier quotation none identifier lo_orderdate
                    second Simple column identifier
                       column Identifier quotation none identifier d_datekey
                 second Binary operation operator AND
                     - first Binary operation operator =
                        - first Simple column identifier

    □ column Identifier quotation none identifier c_region

                        — second String literal
                           - quotation single
                           - literal AMERICA
                     - second Binary operation operator AND
                        - first Binary operation operator =
                           - first Simple column identifier
                            Lolumn Identifier quotation none identifier s_region
                           - second String literal
                             quotation single
                            - literal AMERICA
                        - second Binary operation operator OR
                           - first Binary operation operator =
                            first Simple column identifier
                               column Identifier quotation none identifier p_mfgr
                            second String literal
                               - quotation single
                               - second Binary operation operator =
                            first Simple column identifier
                               column Identifier quotation none identifier p_mfgr
                             - second String literal
                               quotation single
                               grouping Group by clause
         by Expression list size 2
            — item Simple column identifier
              column Identifier quotation none identifier d_year
           item Simple column identifier
              column Identifier quotation none identifier c_nation

    having undefined
```



```
— explain Explain clause
 - explain false
 - query plan false
— stmt Select statement
 core Select core select
     \leftarrow type not specified
      columns Result column list size 4
        item Result column expression
          expression Simple column identifier
             column Identifier quotation none identifier d_year
           - alias undefined

    item Result column expression

           - expression Simple column identifier
             column Identifier quotation none identifier s_nation
          alias undefined
         item Result column expression
           — expression Simple column identifier
             column Identifier quotation none identifier p_category
          - alias undefined
       Litem Result column expression
           - expression Function call
              - name Identifier quotation none identifier sum
              - parameters Function params expr list distinct false
               parameters Expression list size 1

    item Binary operation operator −
                     first Simple column identifier
                        column Identifier quotation none identifier lo_revenue
                      second Simple column identifier
                        column Identifier quotation none identifier lo_supplycost
          alias Identifier quotation none identifier profit
      - from Table or subquery list size 5
        item Table or subquery table
           - table Aliased table identifier
              - table Simple table identifier
               table Identifier quotation none identifier date
              - alias undefined
          index not specified

    item Table or subquery table

           table Aliased table identifier
              - table Simple table identifier
               table Identifier quotation none identifier customer
             - alias undefined
           index not specified
         - item Table or subquery table
           - table Aliased table identifier
              - table Simple table identifier
               table Identifier quotation none identifier supplier
              - alias undefined
          index not specified

    item Table or subquery table

    table Aliased table identifier

              - table Simple table identifier
               Lable Identifier quotation none identifier part
             └─ alias undefined
          index not specified
        item Table or subquery table
          table Aliased table identifier
              - table Simple table identifier
               Lable Identifier quotation none identifier lineorder
             alias undefined
           - index not specified
     — where Binary operation operator AND
        - first Binary operation operator =
          - first Simple column identifier
             column Identifier quotation none identifier lo_custkey

    second Simple column identifier

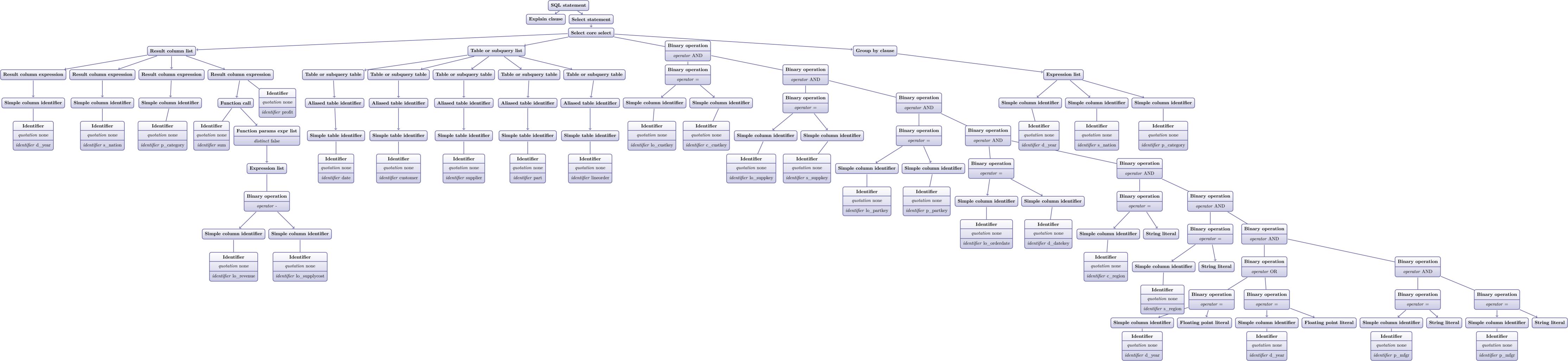
             column Identifier quotation none identifier c_custkey
       second Binary operation operator AND
           - first Binary operation operator =
              - first Simple column identifier
               column Identifier quotation none identifier lo_suppkey
             second Simple column identifier
               column Identifier quotation none identifier s_suppkey
           - second Binary operation operator AND
              - first Binary operation operator =
                first Simple column identifier
                  column Identifier quotation none identifier lo_partkey
                second Simple column identifier
                  column Identifier quotation none identifier p_partkey
              - second Binary operation operator AND
                 - first Binary operation operator =
                    - first Simple column identifier
                     column Identifier quotation none identifier lo_orderdate
                  second Simple column identifier
                     L column Identifier quotation none identifier d_datekey
                 second Binary operation operator AND
                   first Binary operation operator =
                      - first Simple column identifier
                        column Identifier quotation none identifier c_region
                     - second String literal
                        quotation single
                        - literal AMERICA
                  second Binary operation operator AND
                      - first Binary operation operator =
                         - first Simple column identifier
                           Le column Identifier quotation none identifier s_region
                        second String literal
                           quotation single
                            - literal AMERICA
                     second Binary operation operator AND
                         - first Binary operation operator OR
                            - first Binary operation operator =
                              first Simple column identifier
                                column Identifier quotation none identifier d_year
                              second Floating point literal
                                 - literal 1997.000000
                            - second Binary operation operator =
                              first Simple column identifier
                                column Identifier quotation none identifier d_year
                              second Floating point literal
                                - second Binary operation operator AND
                           first Binary operation operator =
                              first Simple column identifier
                                 column Identifier quotation none identifier p_mfgr
                              quotation single
                                 └─ literal MFGR#1
                           second Binary operation operator =

    first Simple column identifier

                                column Identifier quotation none identifier p_mfgr
                              second String literal
                                 quotation single
                                 — grouping Group by clause
       by Expression list size 3
           - item Simple column identifier
             column Identifier quotation none identifier d_year

    item Simple column identifier

             Le column Identifier quotation none identifier s_nation
          Litem Simple column identifier
             column Identifier quotation none identifier p_category
```



```
SQL statement
 - explain Explain clause
   - explain false
   - query plan false
 - stmt Select statement
   - core Select core select
       type not specified
       columns Result column list size 4
         item Result column expression
           expression Simple column identifier
              column Identifier quotation none identifier d_year

    alias undefined

         _ item Result column expression

    expression Simple column identifier

              column Identifier quotation none identifier s_city
           alias undefined
          - item Result column expression
            - expression Simple column identifier
              column Identifier quotation none identifier p_brand1
           alias undefined
        item Result column expression
             - expression Function call
              - name Identifier quotation none identifier sum
              parameters Function params expr list distinct false
                 parameters Expression list size 1
                    item Binary operation operator -
                       first Simple column identifier
                         column Identifier quotation none identifier lo_revenue
                        second Simple column identifier
                          column Identifier quotation none identifier lo_supplycost
            - alias Identifier quotation none identifier profit
       - from Table or subquery list size 5

    item Table or subquery table

             - table Aliased table identifier

    table Simple table identifier

                 Lable Identifier quotation none identifier date
              alias undefined
           index not specified

    item Table or subquery table

    table Aliased table identifier

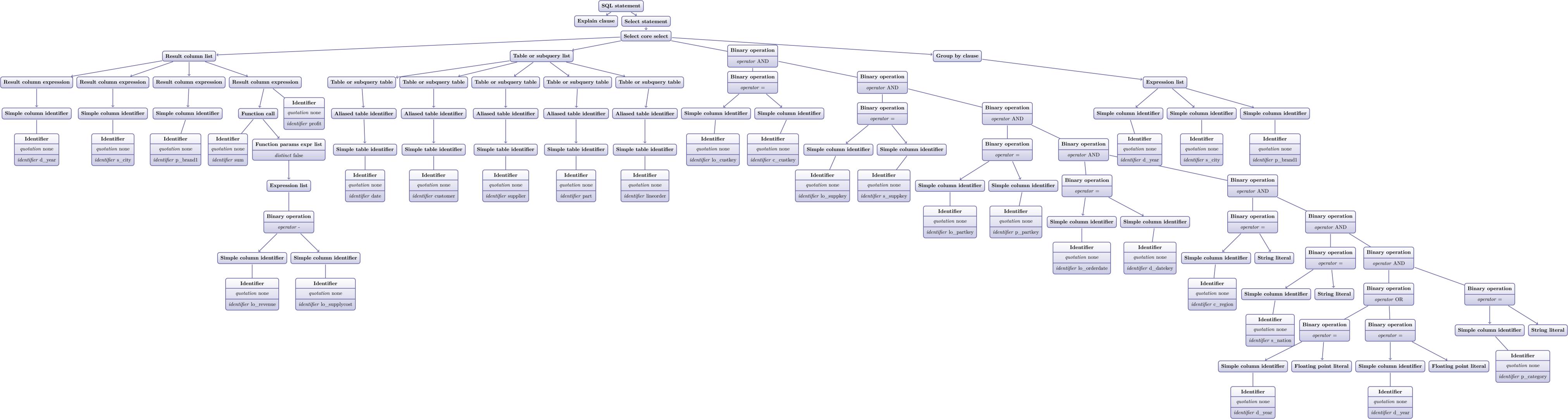
               - table Simple table identifier
                 Lable Identifier quotation none identifier customer
              - alias undefined
            - index not specified
          - item Table or subquery table
             - table Aliased table identifier
               - table Simple table identifier
                table Identifier quotation none identifier supplier
              alias undefined
           index not specified

    item Table or subquery table

            ⊢ table Aliased table identifier
               - table Simple table identifier
                 Lable Identifier quotation none identifier part
              \vdash alias undefined
           index not specified
         — item Table or subquery table
           table Aliased table identifier
               — table Simple table identifier
                 Lable Identifier quotation none identifier lineorder

    alias undefined

             - index not specified
       - where Binary operation operator AND
          - first Binary operation operator =
           first Simple column identifier
              column Identifier quotation none identifier lo_custkey
            second Simple column identifier
              column Identifier quotation none identifier c_custkey
        second Binary operation operator AND
            - first Binary operation operator =
               - first Simple column identifier
                 column Identifier quotation none identifier lo_suppkey
              second Simple column identifier
                 Lolumn Identifier quotation none identifier s_suppkey
             - second Binary operation operator AND
               - first Binary operation operator =
                  - first Simple column identifier
                    column Identifier quotation none identifier lo_partkey
                  — second Simple column identifier
                    column Identifier quotation none identifier p_partkey
              second Binary operation operator AND
                  - first Binary operation operator =
                     first Simple column identifier
                      Lolumn Identifier quotation none identifier lo_orderdate
                    second Simple column identifier
                       column Identifier quotation none identifier d_datekey
                  second Binary operation operator AND
                    first Binary operation operator =
                        - first Simple column identifier
                          column Identifier quotation none identifier c_region
                       - quotation single
                          - literal AMERICA
                    second Binary operation operator AND
                       first Binary operation operator =
                           - first Simple column identifier
                            column Identifier quotation none identifier s_nation
                          second String literal
                             — quotation single
                            - literal UNITEDSTATES
                       second Binary operation operator AND
                           - first Binary operation operator OR
                              - first Binary operation operator =
                               first Simple column identifier
                                  Lolumn Identifier quotation none identifier d_year
                               second Floating point literal
                                  - literal 1997.000000
                              second Binary operation operator =
                               first Simple column identifier
                                  column Identifier quotation none identifier d_year
                                - second Floating point literal
                                  - literal 1998.000000
                           second Binary operation operator =
                             first Simple column identifier
                               column Identifier quotation none identifier p_category
                             - second String literal
                               quotation single
                                -literal MFGR#14
       grouping Group by clause
         - by Expression list size 3
            - item Simple column identifier
              column Identifier quotation none identifier d_year
            - item Simple column identifier
              Lolumn Identifier quotation none identifier s_city
           item Simple column identifier
              column Identifier quotation none identifier p_brand1
          - having undefined
```



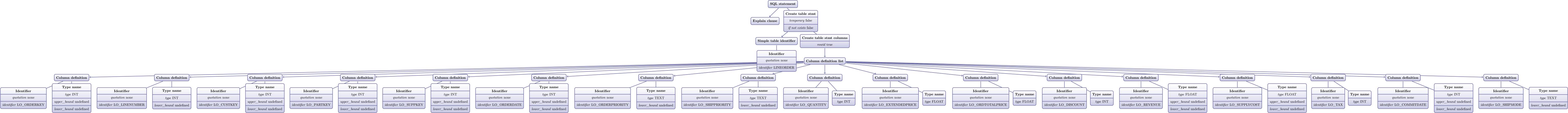
```
SQL statement
 — explain Explain clause
   explain false
   identifier Simple table identifier
      table Identifier quotation none identifier LINEORDER
    - definition Create table stmt columns rowid true
      columns Column definition list size 17

    item Column definition

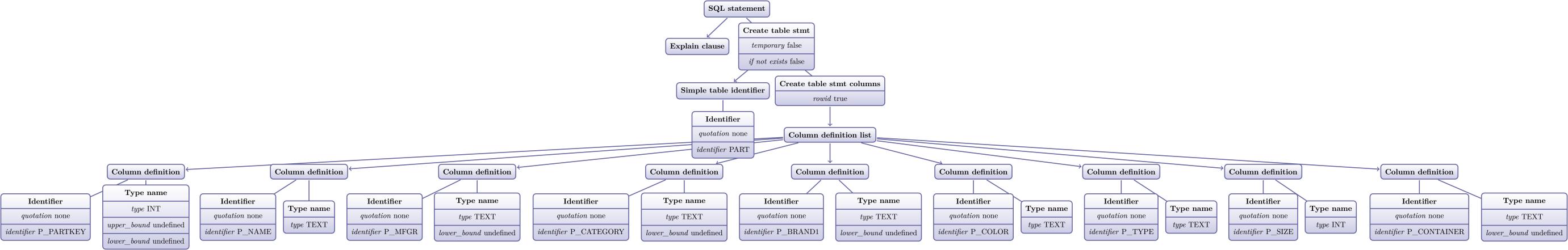
            - identifier Identifier quotation none identifier LO_ORDERKEY
            - type Type name type INT upper_bound undefined lower_bound undefined
          - item Column definition
            - identifier Identifier quotation none identifier LO_LINENUMBER
            - type Type name type INT upper_bound Floating point literal
              - literal 7.000000
          - item Column definition
           identifier Identifier quotation none identifier LO_CUSTKEY
           type Type name type INT upper_bound undefined lower_bound undefined
          - item Column definition
           identifier Identifier quotation none identifier LO_PARTKEY
           type Type name type INT upper_bound undefined lower_bound undefined
          - item Column definition
           identifier Identifier quotation none identifier LO_SUPPKEY
           type Type name type INT upper_bound undefined lower_bound undefined
          - item Column definition
           identifier Identifier quotation none identifier LO_ORDERDATE
           type Type name type INT upper_bound undefined lower_bound undefined
          - item Column definition
           identifier Identifier quotation none identifier LO_ORDERPRIORITY
           type Type name type TEXT upper_bound Floating point literal
              - item Column definition
             - identifier Identifier quotation none identifier LO_SHIPPRIORITY
            - type Type name type TEXT upper_bound Floating point literal
              └─ literal 1.000000
          item Column definition
            - identifier Identifier quotation none identifier LO_QUANTITY
           type Type name type INT upper_bound Floating point literal
              - literal 50.000000
              - literal 1.000000
          - item Column definition
             - identifier {\tt Identifier} quotation {\tt none} identifier {\tt LO\_EXTENDEDPRICE}
            - type Type name type FLOAT upper_bound Floating point literal
              - literal 450.000000
              └─ literal 55.000000
           item Column definition
             - identifier Identifier quotation none identifier LO_ORDTOTALPRICE
            type Type name type FLOAT upper_bound Floating point literal
              - literal 0.000000
               - literal 388.000000
          item Column definition
             - identifier Identifier quotation none identifier LO_DISCOUNT
            type Type name type INT upper_bound Floating point literal
              literal 10.000000
              literal 0.000000

    item Column definition

            identifier Identifier quotation none identifier LO_REVENUE
            ← type Type name type FLOAT upper_bound undefined lower_bound undefined
          - item Column definition
             - identifier Identifier quotation none identifier LO_SUPPLYCOST
            - type Type name type FLOAT upper_bound undefined lower_bound undefined
          - item Column definition
             - identifier Identifier quotation none identifier LO_TAX
            - type Type name type INT upper_bound Floating point literal
              - literal 8.000000
              └─ literal 0.000000
          item Column definition
            - identifier Identifier quotation none identifier LO_COMMITDATE
            - type Type name type INT upper_bound undefined lower_bound undefined
          - item Column definition
             - identifier Identifier quotation none identifier LO_SHIPMODE
            - type Type name type TEXT upper_bound Floating point literal
              - literal 10.000000
```



```
SQL statement
 — explain Explain clause
   explain false
   - stmt Create table stmt temporary false if not exists false
   identifier Simple table identifier
      Lable Identifier quotation none identifier PART
    - definition Create table stmt columns rowid true
      columns Column definition list size 9
          - item Column definition
             - identifier Identifier quotation none identifier P_PARTKEY
             - type Type name type INT upper_bound undefined lower_bound undefined
          - item Column definition
             - identifier Identifier quotation none identifier P_NAME
           type Type name type TEXT upper_bound Floating point literal
               -literal 22.000000
               -literal 0.000000
          - item Column definition
             - identifier Identifier quotation none identifier P_MFGR
           type Type name type TEXT upper_bound Floating point literal
              - literal 6.000000
          - item Column definition
             - identifier Identifier quotation none identifier P_CATEGORY
            - type Type name type TEXT upper_bound Floating point literal
              └ literal 7.000000
          item Column definition
             - identifier Identifier quotation none identifier P_BRAND1
           type Type name type TEXT upper_bound Floating point literal
              └─ literal 9.000000
          item Column definition
            identifier Identifier quotation none identifier P_COLOR
           type Type name type TEXT upper_bound Floating point literal
              - literal 11.000000
              └─ literal 0.000000
          item Column definition
            identifier Identifier quotation none identifier P_TYPE
           type Type name type TEXT upper_bound Floating point literal
              - literal 25.000000
              └─ literal 0.000000
          item Column definition
            identifier Identifier quotation none identifier P_SIZE
           type Type name type INT upper_bound Floating point literal
              ├- literal 50.000000
              - literal 1.000000
          item Column definition
             - identifier Identifier quotation none identifier P_CONTAINER
             - type Type name type TEXT upper_bound Floating point literal
              - literal 10.000000
```



```
SQL statement
explain Explain clause
   explain false
   - query plan false
stmt Create table stmt temporary false if not exists false
   - identifier Simple table identifier
      table Identifier quotation none identifier SUPPLIER
   definition Create table stmt columns rowid true
      - columns Column definition list size 7
          - item Column definition
           identifier Identifier quotation none identifier S_SUPPKEY
           type Type name type INT upper_bound undefined lower_bound undefined

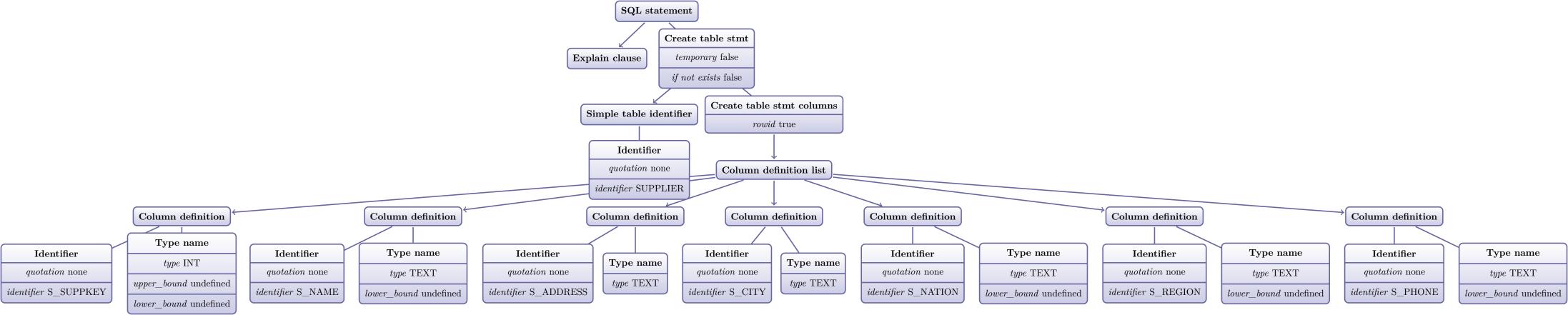
    item Column definition

           identifier Identifier quotation none identifier S_NAME
           type Type name type TEXT upper_bound Floating point literal
              - literal 25.000000
         - item Column definition
           identifier Identifier quotation none identifier S_ADDRESS
           type Type name type TEXT upper_bound Floating point literal
              - literal 25.000000
              - literal 0.000000
         - item Column definition
           identifier Identifier quotation none identifier S_CITY
           type Type name type TEXT upper_bound Floating point literal
              ← literal 10.000000
              - literal 0.000000

    item Column definition

    identifier Identifier quotation none identifier S_NATION

           type Type name type TEXT upper_bound Floating point literal
              - literal 15.000000
          - item Column definition
           identifier Identifier quotation none identifier S_REGION
           type Type name type TEXT upper_bound Floating point literal
              - literal 12.000000
          - item Column definition
            - identifier Identifier quotation none identifier S_PHONE
           type Type name type TEXT upper_bound Floating point literal
              - literal 15.000000
```



```
SQL statement
explain Explain clause
   explain false
  uery plan false
- identifier Simple table identifier
     table Identifier quotation none identifier CUSTOMER
   definition Create table stmt columns rowid true
     - columns Column definition list size 5
         - item Column definition
          identifier Identifier quotation none identifier C_CUSTKEY
          type Type name type INT upper_bound undefined lower_bound undefined

    item Column definition

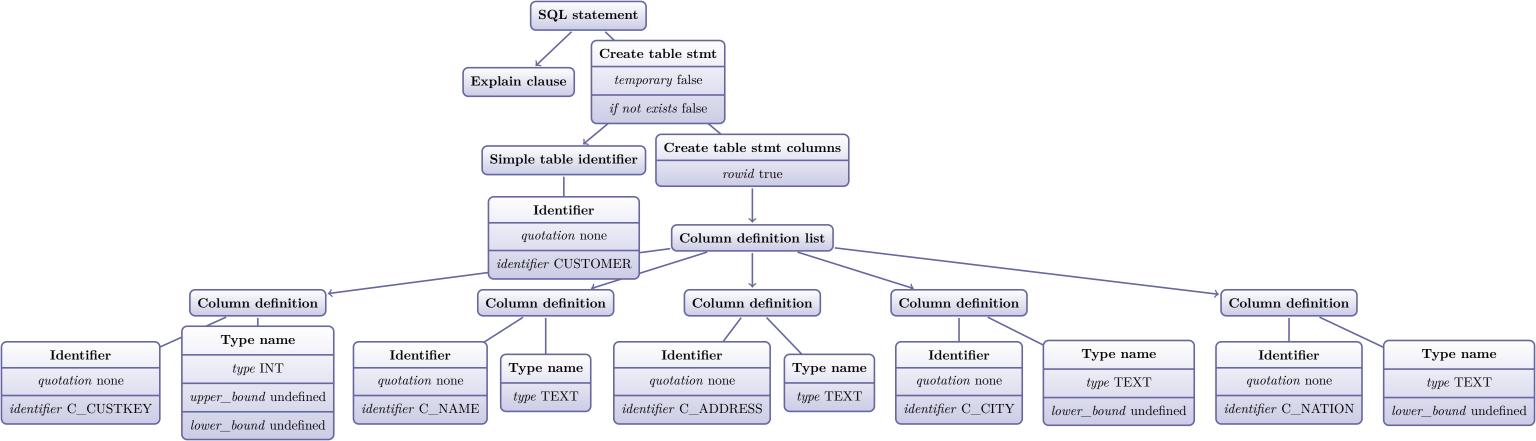
          - identifier Identifier quotation none identifier C_NAME
          type Type name type TEXT upper bound Floating point literal
             - literal 25.000000
             └ literal 0.000000

    item Column definition

          identifier Identifier quotation none identifier C_ADDRESS
           type Type name type TEXT upper_bound Floating point literal
             - literal 25.000000
             └ literal 0.000000

    item Column definition

          identifier Identifier quotation none identifier C_CITY
           type Type name type TEXT upper bound Floating point literal
             - literal 10.000000
        item Column definition
           identifier Identifier quotation none identifier C_NATION
           type Type name type TEXT upper bound Floating point literal
             - literal 15.000000
```



```
SQL statement
 - explain Explain clause
   explain false
   - identifier Simple table identifier
     Lable Identifier quotation none identifier DATE
    - definition Create table stmt columns rowid true
     - columns Column definition list size 17
         - item Column definition
           — identifier Identifier quotation none identifier D_DATEKEY
           - type Type name type INT upper_bound undefined lower_bound undefined
         - item Column definition
           identifier Identifier quotation none identifier D_DATE
           type Type name type TEXT upper_bound Floating point literal
             - literal 18.000000
         - item Column definition
           identifier Identifier quotation none identifier D_DAYOFWEEK
           type Type name type TEXT upper_bound Floating point literal
             └─ literal 8.000000
         - item Column definition
           identifier Identifier quotation none identifier D_MONTH
           type Type name type TEXT upper_bound Floating point literal
             - literal 9.000000
         - item Column definition
           identifier Identifier quotation none identifier D_YEAR
           type Type name type INT upper_bound Floating point literal
             - literal 1998.000000
              -literal 1992.000000
         - item Column definition
            - identifier Identifier quotation none identifier D_YEARMONTHNUM
           type Type name type INT upper_bound Floating point literal
             - literal 300012.000000
              - literal 111111.000000
         - item Column definition
           — identifier Identifier quotation none identifier D_YEARMONTH
           type Type name type TEXT upper_bound Floating point literal
             └─ literal 7.000000
         item Column definition
           identifier Identifier quotation none identifier D_DAYNUMINWEEK
           type Type name type INT upper_bound Floating point literal
             ├ literal 7.000000
             literal 1.000000
          item Column definition
           identifier Identifier quotation none identifier D_DAYNUMINMONTH
           type Type name type INT upper_bound Floating point literal
              - literal 31.000000
             item Column definition
            - identifier Identifier quotation none identifier D_DAYNUMINYEAR
           type Type name type INT upper_bound Floating point literal
             - literal 366.000000
             item Column definition
           identifier Identifier quotation none identifier D_MONTHNUMINYEAR
           type Type name type INT upper_bound Floating point literal
             ├ literal 12.000000
             item Column definition
            - identifier Identifier quotation none identifier D_WEEKNUMINYEAR
           type Type name type INT upper_bound Floating point literal
             item Column definition
           identifier Identifier quotation none identifier D_SELLINGSEASON
           type Type name type TEXT upper_bound Floating point literal
             - literal 12.000000
             item Column definition
            - identifier Identifier quotation none identifier D_LASTDAYINWEEKFL
           Lype Type name type BOOLEAN upper_bound undefined lower_bound undefined
         - item Column definition
           identifier Identifier quotation none identifier D_LASTDAYINMONTHFL
           type Type name type BOOLEAN upper_bound undefined lower_bound undefined
         - item Column definition
            - identifier Identifier quotation none identifier D_HOLIDAYFL
           type Type name type BOOLEAN upper_bound undefined lower_bound undefined
         - item Column definition
           identifier Identifier quotation none identifier D_WEEKDAYFL
           Luppe Type name type BOOLEAN upper_bound undefined lower_bound undefined
```

