# ECL Cheat Sheet

A simple introduction to ECL — so you can master it with ease.
https://github.com/hpcc-systems/HPCC-ECL-Training/blob/master/CheatSheet/ECL_Cheat_Sheet.pdf

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## Dataset

A representation of data on disk or created in memory. Most ECL functions return a DATASET.

```
Layout := RECORD
    STRING pickup_dt;
    DECIMAL8_2 fare;
END;

//Reading embedded data
memDs := DATASET([{'2019-01-01 01:08:56', 25.10},
                  {'2019-01-01 02:10:22', 40.15}],
Layout);

OUTPUT(memDs);

//Reading CSV file data
fileDs := DATASET(

'~tutorials::cheatsheet::in::sample_trip_1.csv',
          Layout, CSV);

OUTPUT(fileDs);
```

| INPUT | |
|---|---|
| pickup_dt | Fare |
| 2019-01-01 01:08:56 | 25.10 |
| 2019-01-01 02:10:22 | 40.15 |

## Summarize

Provides a large set of functions to summarize values in a dataset. Can be used in functions with GROUP and TABLE to create Pivots.

```
Layout := RECORD
    STRING pickup_dt;
    DECIMAL8_2 fare;
END;

ds := DATASET([{'2019-01-01 01:08:56', 25.10},
               {'2019-01-01 02:10:22', 40.15}],
Layout);

sumVal := SUM(ds, ds.fare);
avgVal := AVE(ds, ds.fare);
minVal := MIN(ds, ds.fare);
maxVal := MAX(ds, ds.fare);
countVal := COUNT(ds);

OUTPUT(DATASET([{'sum',sumVal},
                {'avg',avgVal},
                {'min', minVal},
                {'max', maxVal},
                {'count', countVal}],
                {String typ, DECIMAL8_2 val}));
```

| OUTPUT | |
|---|---|
| typ | val |
| sum | 65.25 |
| ave | 32.63 |
| min | 25.1 |
| max | 40.15 |
| count | 2 |

## Observe Subset

Select a subset of rows in a dataset for observation.

```
Layout := RECORD
    STRING10 pickup_date;
    DECIMAL8_2 fare;
    DECIMAL8_2 distance;
END;

ds := DATASET([{'2019-01-01', 25.10, 5},
               {'2019-01-01', 40.15, 8},
               {'2019-01-02', 30.10, 6},
               {'2019-01-02', 25.15, 4}], Layout);

//Filter records by fields
filterDs :=  ds(pickup_date='2019-01-01');

//Remove duplicate records
dedupDs := DEDUP(SORT(ds, pickup_date),
pickup_date);

//Returns top N records
choosenDs := CHOOSEN(ds, 2);//Return top 2 records

//Return top N records after sorting
topDs := TOPN(ds, 2, pickup_date);

//Return sample part of set
sampleDs := SAMPLE(ds, 2, 1);//return every 2nd
record

//Return sample set of records
enthDs := ENTH(ds, 1, 2, 1);//1 out of every 2

OUTPUT(filterDs);
OUTPUT(dedupDs);
OUTPUT(topDs);
OUTPUT(sampleDs);
OUTPUT(enthDs);
```

| INPUT | |
|---|---|
| | |
| | |
| | |
| | |
| | |

| OUTPUT | |
|---|---|
| | |
| | |

## Shape with Project

Used to transform datasets with the same number of records but transformed columns.

```
IMPORT Std;

InputLayout := RECORD
    STRING pickup_datetime;
    DECIMAL8_2 fare;
    DECIMAL8_2 distance;
END;

OutputLayout := RECORD
    Std.Date.Date_t pickup_date;
    Std.Date.Time_t pickup_time;
    DECIMAL8_2 fare;
    DECIMAL8_2 distance;
END;

inputDs := DATASET([{'2019-01-01 10:00:00', 25.10, 5},
                    {'2019-01-01 11:00:00', 40.15, 8},
                    {'2019-01-02 10:00:00', 30.10, 6},
                    {'2019-01-02 11:00:00', 25.15, 4}],
                        InputLayout);

outputDs := PROJECT(inputDs, TRANSFORM(OutputLayout,
   SELF.pickup_date :=
Std.Date.FromStringToDate(LEFT.pickup_datetime[..10],
'%Y-%m-%d'),
   SELF.pickup_time :=
Std.Date.FromStringToTime(LEFT.pickup_datetime[12..],
'%H:%M:%S'),
   SELF.fare := LEFT.fare,
   SELF.distance := LEFT.distance));
OUTPUT(outputDs);
```

| INPUT | | |
|---|---|---|
| pickup_datetime | fare | dist |
| 2019-01-01 10:00:00 | 25.10 | 5 |
| 2019-01-01 11:00:00 | 40.15 | 8 |
| 2019-01-02 10:00:00 | 30.10 | 6 |
| 2019-01-02 10:00:00 | 25.15 | 4 |

| OUTPUT | | | |
|---|---|---|---|
| 20190101 | 100000 | 25.10 | 5 |
| 20190101 | 110000 | 40.15 | 8 |
| 20190102 | 100000 | 30.10 | 6 |
| 20190102 | 110000 | 25.15 | 4 |

## Group

Easily work with cross tab functionality by using GROUP and TABLE functions.

```
Layout := RECORD
    STRING10 pickup_date;
    DECIMAL8_2 fare;
    DECIMAL8_2 distance;
END;

ds := DATASET([{'2019-01-01', 25.10, 5},
               {'2019-01-01', 40.15, 8},
               {'2019-01-02', 30.10, 6},
               {'2019-01-02', 25.15, 4}], Layout);

crossTabLayout := RECORD
   ds.pickup_date;
   avgFare := AVE(GROUP, ds.fare);
   totalFare := SUM(GROUP, ds.fare);
   varianceFare := VARIANCE(GROUP, ds.fare);
   coVarianceFareDist := COVARIANCE(GROUP,
                         ds.fare, ds.distance);
   correlateFareDist := CORRELATION(GROUP,
                         ds.fare, ds.distance);
END;

crossTabDs := TABLE(ds, crossTabLayout, pickup_date);
OUTPUT(crossTabDs);
```

| INPUT | | |
|---|---|---|
| pickup_date | fare | distance |
| 2019-01-01 | 25.10 | 5 |
| 2019-01-01 | 40.15 | 8 |
| 2019-01-02 | 30.10 | 6 |
| 2019-01-02 | 25.15 | 4 |

| OUTPUT | | | | | |
|---|---|---|---|---|---|
| pickup_date | avgfare | totalfare | variance fare | covariancefaredist | correlatefaredist |
| 2019-01-01 | 32.625 | 62.25 | 56.62 | 11.28 | 1 |
| 2019-01-02 | 27.625 | 55.25 | 6.125 | 2.47 | 1 |

## Shape with Rollup

In one way, ROLLUP is used combine related records into a single aggregate record, like an aggregating SQL self join.

```
Layout := RECORD
    STRING10 pickup_date;
    DECIMAL8_2 fare;
    DECIMAL8_2 distance;
    DECIMAL8_2 mileageDeduction := 0;
END;

inputDs := DATASET([{'2019-01-01', 25.10, 5},
                {'2019-01-01', 40.15, 8},
                {'2019-01-02', 30.10, 6},
                {'2019-01-02', 25.15, 4}], Layout);

// Rollup (aggregate) data daily
outputDs := ROLLUP(SORT(inputDs, pickup_date),
LEFT.pickup_date=RIGHT.pickup_date,
                 TRANSFORM(Layout,
                   SELF.pickup_date :=
                   LEFT.pickup_date,
                   SELF.fare :=  LEFT.fare +
                   RIGHT.fare,
                   SELF.distance := LEFT.distance
                   + RIGHT.distance,
                   SELF.mileageDeduction :=
                   self.distance * 0.545));

OUTPUT(outputDs);
```

## Shape Parent Child Rollup

Rollup records into a parent child layout.

```
InputLayout := RECORD
    STRING10 pickup_date;
    DECIMAL8_2 fare;
    DECIMAL8_2 distance;
END;
OutputLayout := RECORD
    STRING10 pickup_date;
    DATASET(InputLayout) trips;
END;

inputDs := DATASET([{'2019-01-01', 25.10, 5},
                {'2019-01-01', 40.15, 8},
                {'2019-01-02', 30.10, 6},
                {'2019-01-02', 25.15, 4}],
InputLayout);

groupDs := GROUP(SORT(inputDs, pickup_date),
pickup_date);

tempDs := ROLLUP(groupDs, GROUP,
TRANSFORM(OutputLayout,
          SELF.pickup_date := LEFT.pickup_date,
          SELF.trips := ROWS(LEFT)));

OUTPUT(tempDs);
```

INPUT

| pickup_datetime | fare | distance |
|---|---|---|
| 2019-01-01 10:00:00 | 25.10 | 5 |
| 2019-01-01 11:00:00 | 40.15 | 8 |
| 2019-01-02 10:00:00 | 30.10 | 6 |
| 2019-01-02 10:00:00 | 25.15 | 4 |

OUTPUT: SHAPING WITH ROLLUP

| pickup_date | fare | distance | mileagededuction |
|---|---|---|---|
| 2019-01-01 | 65.25 | 13 | 7.09 |
| 2019-01-02 | 55.25 | 20 | 5.45 |

OUTPUT: SHAPING WITH PARENT CHILD ROLLUP

| pickup_date | trips | | |
|---|---|---|---|
| | pickup_date | fare | distance |
| 2019-01-01 | 2019-01-01 | 25.1 | 5 |
| | 2019-01-01 | 40.15 | 8 |
| 2019-01-02 | 2019-01-02 | 30.1 | 6 |
| | 2019-01-02 | 25.15 | 4 |

## Shape with Normalize

Break contents of record into normal form.

```
IMPORT Std;

InputLayout := RECORD
    UNSIGNED ride_id;
    STRING passenger_state;
END;

inputDs := DATASET([{1, 'group cool talkative'},
                {2, 'calm quite'},
                {3, 'temper nasty'},
                {4, 'drunk smell'}], InputLayout);

 OutputLayout := RECORD
     UNSIGNED ride_id;
     STRING100 word;
 END;

wordDs := NORMALIZE(inputDs,

STD.Str.WordCount(LEFT.passenger_state),
                TRANSFORM(OutputLayout,
                          SELF.ride_id :=
                          LEFT.ride_id,
                          SELF.word :=
STD.Str.ToUpperCase(

STD.Str.GetNthWord(LEFT.passenger_state,
COUNTER))));
OUTPUT(wordDs);
```

INPUT

| ride_id | passenger_state |
|---|---|
| 1 | group cool talkative |
| 2 | calm quiet |
| 3 | temper nasty |
| 4 | drunk smell |

OUTPUT

| ride_id | word |
|---|---|
| 1 | GROUP |
| 1 | COOL |
| 1 | TALKATIVE |
| 2 | CALM |
| 2 | QUIET |
| 3 | TEMPER |
| 3 | NASTY |
| 4 | DRUNK |
| 4 | SMELL |

## Denormalize

Combine data from two normalized Datasets.

```
WeatherLayout := RECORD
    STRING10 weather_date;
    UNSIGNED hour;
    DECIMAL8_2 rain_quantity;
END;
TripLayout := RECORD
    STRING10 pickup_date;
    DECIMAL8_2 fare;
    DECIMAL8_2 distance;
    DATASET(WeatherLayout) weatherDs ;
END;
tripDs := DATASET(
  [{'2019-01-01', 25.10, 5, []},
   {'2019-01-01', 40.15, 8, []},
   {'2019-01-02', 30.10, 6, []},
   {'2019-01-02', 25.15, 4, []}], TripLayout);

weatherDs := DATASET(
  [{'2019-01-01', 1, 0.5},
   {'2019-01-01', 2, 1},
   {'2019-01-02', 1, 0},
   {'2019-01-02', 2, 0}], WeatherLayout);

outputDs := DENORMALIZE(
   tripDs, weatherDs,
   LEFT.pickup_date=RIGHT.weather_date,
   GROUP,
   TRANSFORM(TripLayout,
         SELF.pickup_date := LEFT.pickup_date,
         SELF.fare := LEFT.fare,
         SELF.distance := LEFT.distance,
         SELF.weatherDs := ROWS(RIGHT)));
OUTPUT(outputDs);
```

INPUT

| pickup_date | fare | distance |
|---|---|---|
| 2019-01-01 | 25.10 | 5 |
| 2019-01-01 | 40.15 | 8 |
| 2019-01-02 | 30.10 | 6 |
| 2019-01-02 | 25.15 | 4 |

+

| weather_date | hour | rain_quantity |
|---|---|---|
| 2019-01-01 | 1 | 50.5 |
| 2019-01-01 | 2 | 1 |
| 2019-01-02 | 1 | 0 |
| 2019-01-02 | 2 | 0 |

OUTPUT

| pickup_date | fare | distance | weatherds | | |
|---|---|---|---|---|---|
| | | | weather_date | hour | rain_quantity |
| 2019-01-01 | 21.5 | 5 | 2019-01-01 | 1 | 0.5 |
| | | | 2019-01-01 | 2 | 1 |
| 2019-01-01 | 40.15 | 8 | 2019-01-01 | 1 | 0.5 |
| | | | 2019-01-01 | 2 | 1 |
| 2019-01-02 | 30.1 | 6 | 2019-01-02 | 1 | 0 |
| | | | 2019-01-02 | 2 | 0 |
| 2019-01-02 | 25.15 | 4 | 2019-01-02 | 1 | 0 |
| | | | 2019-01-02 | 2 | 0 |

## Combine

Used to transform datasets with the same number of records but transformed columns.

```
TripLayout := RECORD
    STRING10 pickup_date;
    DECIMAL8_2 distance;
END;

WeatherLayout := RECORD
    STRING10 weather_date;
    DECIMAL8_2 rain_quantity;
END;

tripDs := DATASET(
  [{'2019-01-01', 11000},
   {'2019-01-02', 12500},
   {'2019-01-03', 11800},
   {'2019-01-04', 13000}], TripLayout);

weatherDs := DATASET(
    [{'2019-01-01', 0.5},
     {'2019-01-02', 1},
     {'2019-01-05', 0},
     {'2019-01-06', 0}], WeatherLayout);
```

INPUT

| pickup_date | distance |
|---|---|
| 2019-01-01 | 11000 |
| 2019-01-01 | 12500 |
| 2019-01-03 | 11800 |
| 2019-01-04 | 13000 |

+

| weather_date | rain_quantity |
|---|---|
| 2019-01-01 | 0.5 |
| 2019-01-02 | 1 |
| 2019-01-05 | 0 |
| 2019-01-06 | 0 |

Try the code at
https://play.hpccsystems.com:18010/#/stub/ECL-DL/Playground
and view the results

```
JOIN(tripDs, weatherDs, LEFT.pickup_date=RIGHT.weather_date);//Only those records that exist in both
JOIN(tripDs, weatherDs, LEFT.pickup_date=RIGHT.weather_date,LEFT OUTER);//At least one record for every record in
the left
JOIN(tripDs, weatherDs, LEFT.pickup_date=RIGHT.weather_date,RIGHT OUTER);//At least one record for every record in
the right
JOIN(tripDs, weatherDs, LEFT.pickup_date=RIGHT.weather_date,FULL OUTER);//At least one record for every record in
the left and right
JOIN(tripDs, weatherDs, LEFT.pickup_date=RIGHT.weather_date,LEFT ONLY);//One record for each left record with no
match in the right
JOIN(tripDs, weatherDs, LEFT.pickup_date=RIGHT.weather_date,RIGHT ONLY);//One record for each right record with no
match in the left
JOIN(tripDs, weatherDs, LEFT.pickup_date=RIGHT.weather_date,FULL ONLY);//One record for each left and right record
with no match in the opposite
```

Try these examples at https://play.hpccsystems.com:18010/#/stub/ECL-DL/Playground