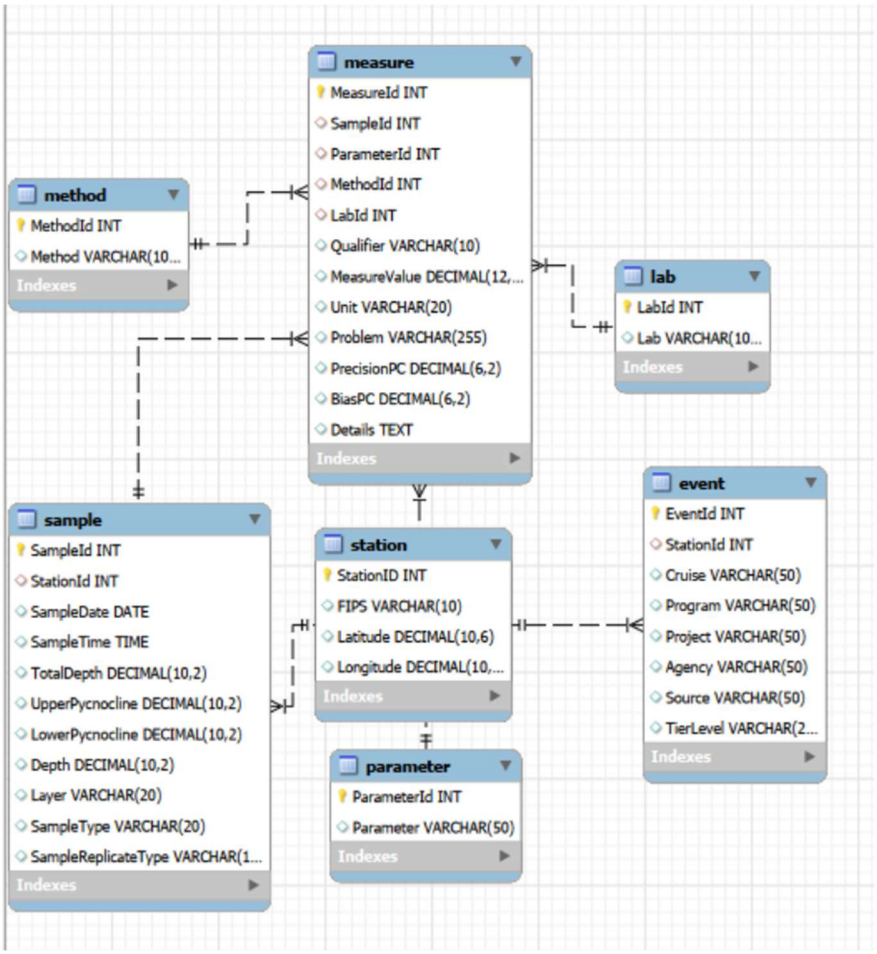
1. All create table SQL statements from Step 1.

```
CREATE TABLE Station (
   StationId INT AUTO_INCREMENT PRIMARY KEY,
   FIPS VARCHAR(10),
   Latitude DECIMAL(10,6),
   Longitude DECIMAL(10,6)
);
CREATE TABLE Event (
   EventId INT PRIMARY KEY,
   StationId INT,
   Cruise VARCHAR(50),
   Program VARCHAR(50),
   Project VARCHAR(50),
   Agency VARCHAR(50),
   Source VARCHAR(50),
   TierLevel VARCHAR(20),
   FOREIGN KEY (StationId) REFERENCES Station(StationId)
);
CREATE TABLE Sample (
   SampleId INT AUTO_INCREMENT PRIMARY KEY,
   StationId INT,
   SampleDate DATE,
   SampleTime TIME,
   TotalDepth DECIMAL(10,2),
   UpperPycnocline DECIMAL(10,2),
   LowerPycnocline DECIMAL(10,2),
```

```
    Depth DECIMAL(10,2),
    Layer VARCHAR(20),
    SampleType VARCHAR(20),
    SampleReplicateType VARCHAR(10),
    FOREIGN KEY (StationId) REFERENCES Station(StationId)
);
CREATE TABLE Parameter (
    ParameterId INT AUTO_INCREMENT PRIMARY KEY,
    Parameter VARCHAR(50)
);
CREATE TABLE Method (
    MethodId INT AUTO_INCREMENT PRIMARY KEY,
    Method VARCHAR(100)
);
CREATE TABLE Lab (
    LabId INT AUTO_INCREMENT PRIMARY KEY,
    Lab VARCHAR(100)
);
CREATE TABLE Measure (
    MeasureId INT AUTO_INCREMENT PRIMARY KEY,
    SampleId INT,
    ParameterId INT,
    MethodId INT,
    LabId INT,
    Qualifier VARCHAR(10),
    MeasureValue DECIMAL(12,4),
```

```
  Unit VARCHAR(20),
  Problem VARCHAR(255),
  PrecisionPC DECIMAL(6,2),
  BiasPC DECIMAL(6,2),
  Details TEXT,
  FOREIGN KEY (SampleId) REFERENCES Sample(SampleId),
  FOREIGN KEY (ParameterId) REFERENCES Parameter(ParameterId),
  FOREIGN KEY (MethodId) REFERENCES Method(MethodId),
  FOREIGN KEY (LabId) REFERENCES Lab(LabId)
);
```

2. A screenshot of your ERD from Step 2.



3. Screenshots of the first 5 rows of data from any TWO tables of your choice, showing all columns.

```
SELECT *
FROM Sample
LIMIT 5;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content: | Fetch rows:

SampleId	StationId	SampleDate	SampleTime	TotalDepth	UpperPycnocline	LowerPycnocline	Depth	Layer	SampleType	SampleReplicateType
1	302031	2021-01-28	10:36:00	NULL	NULL	NULL	NULL	S	HVIC	S1
2	302031	2021-02-02	10:15:00	NULL	NULL	NULL	NULL	S	HVIC	S1
3	302031	2021-02-24	09:17:00	NULL	NULL	NULL	NULL	S	HVIC	S1
4	302031	2021-03-10	09:03:00	NULL	NULL	NULL	NULL	S	HVIC	S1
5	302031	2021-04-20	08:41:00	NULL	NULL	NULL	NULL	S	HVIC	S1
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

```
SELECT *
FROM Measure
LIMIT 5;
```

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content: | Fetch rows:

MeasureId	SampleId	ParameterId	MethodId	LabId	Qualifier	MeasureValue	Unit	Problem	PrecisionPC	BiasPC	Details
1	2724	1	1	1		1.8727	UG/L		NULL	NULL	nan
2	2693	1	1	1		1.8727	UG/L		NULL	NULL	nan
3	2674	1	1	1		1.8727	UG/L		NULL	NULL	nan
4	2641	1	1	1		1.8727	UG/L		NULL	NULL	nan
5	2622	1	1	1		1.8727	UG/L		NULL	NULL	nan
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

4. All SQL queries for each of the four questions.

Q1:

```
SELECT ParameterId
FROM Parameter
WHERE Parameter = 'CHLA';

SELECT
  MONTH(S.SampleDate) AS Month,
```

```
   AVG(M.MeasureValue) AS Avg_CHLA
FROM Measure M
JOIN Sample S ON M.SampleId = S.SampleId
WHERE M.ParameterId = 1
GROUP BY MONTH(S.SampleDate)
ORDER BY Month;

SELECT AVG(M.MeasureValue) AS Overall_Avg_CHLA
FROM Measure M
WHERE M.ParameterId = 1;
```

Q2:

```
SELECT
   S.StationId,
   MAX(M.MeasureValue) AS Max_CHLA,
   (SELECT S2.SampleDate
    FROM Measure M2
    JOIN Sample S2 ON M2.SampleId = S2.SampleId
    WHERE M2.ParameterId = 1 AND S2.StationId = S.StationId
    ORDER BY M2.MeasureValue DESC
    LIMIT 1) AS Date_Max,
   (SELECT S2.SampleTime
    FROM Measure M2
    JOIN Sample S2 ON M2.SampleId = S2.SampleId
    WHERE M2.ParameterId = 1 AND S2.StationId = S.StationId
    ORDER BY M2.MeasureValue DESC
    LIMIT 1) AS Time_Max,

   MIN(M.MeasureValue) AS Min_CHLA,
   (SELECT S3.SampleDate
    FROM Measure M3
    JOIN Sample S3 ON M3.SampleId = S3.SampleId
    WHERE M3.ParameterId = 1 AND S3.StationId = S.StationId
    ORDER BY M3.MeasureValue ASC
    LIMIT 1) AS Date_Min,
   (SELECT S3.SampleTime
    FROM Measure M3
    JOIN Sample S3 ON M3.SampleId = S3.SampleId
```

```
    WHERE M3.ParameterId = 1 AND S3.StationId = S.StationId
    ORDER BY M3.MeasureValue ASC
    LIMIT 1) AS Time_Min
FROM Measure M
JOIN Sample S ON M.SampleId = S.SampleId
WHERE M.ParameterId = 1
GROUP BY S.StationId
ORDER BY S.StationId;
```

Q3:

```
SELECT
   SampleReplicateType,
   COUNT(*) AS NumSamples
FROM Sample
GROUP BY SampleReplicateType
ORDER BY SampleReplicateType;
```

Q4:

```
SELECT
   s.StationId,
   MONTH(s.SampleDate) AS Month,
   MAX(m.MeasureValue) AS MaxCHLA
FROM Measure m
JOIN Sample s ON m.SampleId = s.SampleId
JOIN Parameter p ON m.ParameterId = p.ParameterId
WHERE p.Parameter = 'CHLA'
GROUP BY s.StationId, MONTH(s.SampleDate)
HAVING MAX(m.MeasureValue) <= 18.0
ORDER BY s.StationId, Month;
```