ESCUELA POLITÉCNICA DE INGENIERÍA DE GIJÓN.

MÁSTER UNIVERSITARIO EN INGENIERÍA DE TELECOMUNICACIÓN

ÁREA DE INFORMÁTICA

TRABAJO FIN DE MÁSTER Nº 2018013

CONFIGURACIÓN DE UN ENTORNO BASADO EN CLOUD COMPUTING
ANEXO I

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1.- "PROCEDURE" MARIADB

1.1.- Insert

```
DELIMITER //
CREATE PROCEDURE doiterate1(n1 int)
BEGIN
 DECLARE i INT DEFAULT n1;
 WHILE i > 0 DO

 INSERT INTO capturas1 (fecha_hora,id_variable,Valor,id_canal,id_datalogger)
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('2017-06-08 13:01:00' ,'T2759356762d42a9' ,22.03,14,22),
```

```
('2017-06-08 13:01:00' ,'T4359356762d4358' ,224.57,14,22),
('2017-06-08 13:01:00' ,'T8759356762d4407' ,388.963,14,22),
('2017-06-08 13:01:00' ,'T2759356762d44b6' ,106.521,14,22),
('2017-06-08 13:01:00' ,'T7459356762d4579' ,0.8831,14,22),
('2017-06-08 13:01:00' ,'T8359356762d4632' ,0.211279,14,22),
('2017-06-08 13:01:00' ,'T8359356762d46e8' ,9515.58,14,22),
('2017-06-08 13:01:00' ,'T7959356762d479c' ,23917.1,14,22),
('2017-06-08 13:01:00' ,'T4859356762d4851' ,49.89,14,22),
('2017-06-08 13:01:00' ,'T2059356762d4905' ,6.104,14,22),
('2017-06-08 13:01:00' ,'T8459356762d49ba' ,233.097,14,22),
('2017-06-08 13:01:00' ,'T0459356762d4a70' ,403.734,14,22),
('2017-06-08 13:01:00' ,'T0159356762d4b24' ,370.732,14,22),
('2017-06-08 13:01:00' ,'T9659356762d4bd9' ,0.995,14,22),
('2017-06-08 13:01:00' ,'T0059356762d4c8d' ,80337.4,14,22),
('2017-06-08 13:01:00' ,'T6359356762d4d42' ,23043.6,14,22),
('2017-06-08 13:01:00' ,'T8159356762d4df6' ,83082.2,14,22),
('2017-06-08 13:01:00' ,'T6759356762d4eab' ,50.07,14,22),
('2017-06-08 13:01:00' ,'T8959356762d4f5f' ,90.1,14,22),
('2017-06-08 13:02:00' ,'T6359356762d3007' ,21.3125,14,22),
('2017-06-08 13:02:00' ,'T1659356762d30b9' ,224.757,14,22),
('2017-06-08 13:02:00' ,'T1359356762d3169' ,65.283,14,22),
('2017-06-08 13:02:00' ,'T7859356762d3219' ,0.937,14,22),
('2017-06-08 13:02:00' ,'T6659356762d32c8' ,0.93,14,22),
('2017-06-08 13:02:00' ,'T1459356762d3377' ,13645.7,14,22),
('2017-06-08 13:02:00' ,'T9859356762d3427' ,5093.33,14,22),
('2017-06-08 13:02:00' ,'T4559356762d34d6' ,14672.8,14,22),
('2017-06-08 13:02:00' ,'T4159356762d35a2' ,2.14,14,22),
('2017-06-08 13:02:00' ,'T9059356762d3655' ,13.13,14,22),
('2017-06-08 13:02:00' ,'T7759356762d3705' ,224.312,14,22),
('2017-06-08 13:02:00' ,'T3359356762d37b4' ,42.053,14,22),
('2017-06-08 13:02:00' ,'T5559356762d3863' ,0.945,14,22),
('2017-06-08 13:02:00' ,'T0059356762d3912' ,0.93,14,22),
('2017-06-08 13:02:00' ,'T2859356762d39c1' ,8772.77,14,22),
('2017-06-08 13:02:00' ,'T9959356762d3a71' ,3046.31,14,22),
('2017-06-08 13:02:00' ,'T2059356762d3b20' ,9432.99,14,22),
('2017-06-08 13:02:00' ,'T6359356762d3bd0' ,2.31,14,22),
('2017-06-08 13:02:00' ,'T4459356762d3c7f' ,19.22,14,22),
('2017-06-08 13:02:00' ,'T1159356762d3d2e' ,223.878,14,22),
('2017-06-08 13:02:00' ,'T0259356762d3dde' ,45.215,14,22),
('2017-06-08 13:02:00' ,'T5059356762d3e8e' ,0.953,14,22),
('2017-06-08 13:02:00' ,'T1959356762d3f3d' ,0.938,14,22),
('2017-06-08 13:02:00' ,'T5659356762d3fec' ,9496.14,14,22),
('2017-06-08 13:02:00' ,'T1459356762d409c' ,3034.34,14,22),
('2017-06-08 13:02:00' ,'T6859356762d414b' ,10122.6,14,22),
('2017-06-08 13:02:00' ,'T1959356762d41fa' ,2.25,14,22),
('2017-06-08 13:02:00' ,'T2759356762d42a9' ,18.81,14,22),
('2017-06-08 13:02:00' ,'T4359356762d4358' ,224.301,14,22),
('2017-06-08 13:02:00' ,'T8759356762d4407' ,388.497,14,22),
('2017-06-08 13:02:00' ,'T2759356762d44b6' ,152.554,14,22),
('2017-06-08 13:02:00' ,'T7459356762d4579' ,0.932,14,22),
('2017-06-08 13:02:00' ,'T8359356762d4632' ,0.319157,14,22),
('2017-06-08 13:02:00' ,'T8359356762d46e8' ,11158,14,22),
('2017-06-08 13:02:00' ,'T7959356762d479c' ,34226,14,22),
('2017-06-08 13:02:00' ,'T4859356762d4851' ,49.89,14,22),
('2017-06-08 13:02:00' ,'T2059356762d4905' ,21.604,14,22),
('2017-06-08 13:02:00' ,'T8459356762d49ba' ,233.097,14,22),
('2017-06-08 13:02:00' ,'T0459356762d4a70' ,403.734,14,22),
```

```
 ('2017-06-08 13:02:00' ,'T0159356762d4b24' ,370.732,14,22);

    SET i = i - 1;
  END WHILE;

END //
DELIMITER ;

CALL doiterate1(4550);
```

1.2.- Delete

```
DELETE FROM capturas1 WHERE id_variable = 'T6359356762d3007';
DELETE FROM capturas1 WHERE id_variable = 'T1659356762d30b9';
DELETE FROM capturas1 WHERE id_variable = 'T1359356762d3169';
DELETE FROM capturas1 WHERE id_variable = 'T7859356762d3219';
DELETE FROM capturas1 WHERE id_variable = 'T6659356762d32c8';
DELETE FROM capturas1 WHERE id_variable = 'T1459356762d3377';
DELETE FROM capturas1 WHERE id_variable = 'T9859356762d3427';
DELETE FROM capturas1 WHERE id_variable = 'T4559356762d34d6';
DELETE FROM capturas1 WHERE id_variable = 'T4159356762d35a2';
DELETE FROM capturas1 WHERE id_variable = 'T9059356762d3655';
DELETE FROM capturas1 WHERE id_variable = 'T7759356762d3705';
DELETE FROM capturas1 WHERE id_variable = 'T3359356762d37b4';
DELETE FROM capturas1 WHERE id_variable = 'T5559356762d3863';
DELETE FROM capturas1 WHERE id_variable = 'T0059356762d3912';
DELETE FROM capturas1 WHERE id_variable = 'T2859356762d39c1';
DELETE FROM capturas1 WHERE id_variable = 'T9959356762d3a71';
DELETE FROM capturas1 WHERE id_variable = 'T2059356762d3b20';
DELETE FROM capturas1 WHERE id_variable = 'T6359356762d3bd0';
DELETE FROM capturas1 WHERE id_variable = 'T4459356762d3c7f';
DELETE FROM capturas1 WHERE id_variable = 'T1159356762d3d2e';
DELETE FROM capturas1 WHERE id_variable = 'T0259356762d3dde';
DELETE FROM capturas1 WHERE id_variable = 'T5059356762d3e8e';
DELETE FROM capturas1 WHERE id_variable = 'T1959356762d3f3d';
DELETE FROM capturas1 WHERE id_variable = 'T5659356762d3fec';
DELETE FROM capturas1 WHERE id_variable = 'T1459356762d409c';
DELETE FROM capturas1 WHERE id_variable = 'T6859356762d414b';
DELETE FROM capturas1 WHERE id_variable = 'T1959356762d41fa';
DELETE FROM capturas1 WHERE id_variable = 'T2759356762d42a9';
DELETE FROM capturas1 WHERE id_variable = 'T4359356762d4358';
DELETE FROM capturas1 WHERE id_variable = 'T8759356762d4407';
DELETE FROM capturas1 WHERE id_variable = 'T2759356762d44b6';
DELETE FROM capturas1 WHERE id_variable = 'T7459356762d4579';
DELETE FROM capturas1 WHERE id_variable = 'T8359356762d4632';
DELETE FROM capturas1 WHERE id_variable = 'T8359356762d46e8';
DELETE FROM capturas1 WHERE id_variable = 'T7959356762d479c';
DELETE FROM capturas1 WHERE id_variable = 'T4859356762d4851';
DELETE FROM capturas1 WHERE id_variable = 'T2059356762d4905';
DELETE FROM capturas1 WHERE id_variable = 'T8459356762d49ba';
DELETE FROM capturas1 WHERE id_variable = 'T0459356762d4a70';
DELETE FROM capturas1 WHERE id_variable = 'T0159356762d4b24';
DELETE FROM capturas1 WHERE id_variable = 'T9659356762d4bd9';
DELETE FROM capturas1 WHERE id_variable = 'T0059356762d4c8d';
DELETE FROM capturas1 WHERE id_variable = 'T6359356762d4d42';
DELETE FROM capturas1 WHERE id_variable = 'T8159356762d4df6';
```

```
DELETE FROM capturas1 WHERE id_variable = 'T6759356762d4eab';
DELETE FROM capturas1 WHERE id_variable = 'T8959356762d4f5f';
DELETE FROM capturas1 WHERE id_variable = 'T6359356762d3007';
```

1.3.- Update

```
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T6359356762d3007';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T1659356762d30b9';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T1359356762d3169';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T7859356762d3219';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T6659356762d32c8';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T1459356762d3377';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T9859356762d3427';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T4559356762d34d6';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T4159356762d35a2';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T9059356762d3655';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T7759356762d3705';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T3359356762d37b4';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T5559356762d3863';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T0059356762d3912';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T2859356762d39c1';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T9959356762d3a71';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T2059356762d3b20';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T6359356762d3bd0';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T4459356762d3c7f';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T1159356762d3d2e';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T0259356762d3dde';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T5059356762d3e8e';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T1959356762d3f3d';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T5659356762d3fec';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T1459356762d409c';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T6859356762d414b';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T1959356762d41fa';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T2759356762d42a9';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T4359356762d4358';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T8759356762d4407';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T2759356762d44b6';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T7459356762d4579';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T8359356762d4632';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T8359356762d46e8';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T7959356762d479c';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T4859356762d4851';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T2059356762d4905';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T8459356762d49ba';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T0459356762d4a70';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T0159356762d4b24';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T9659356762d4bd9';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T0059356762d4c8d';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T6359356762d4d42';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T8159356762d4df6';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T6759356762d4eab';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T8959356762d4f5f';
UPDATE capturas1 SET id_canal = '55' WHERE id_variable = 'T6359356762d3007';
```

2.- SCRIPTS MONGODB

2.1.- Replicación

2.1.1.- Insert

Este script es el utilizado para las pruebas de inserción sin datos en la DB.

```
var myobj=[
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T6359356762d3007" ,Valor:21.3125,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T1659356762d30b9" ,Valor:224.325,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T1359356762d3169" ,Valor:43.358,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T7859356762d3219" ,Valor:0.725,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T6659356762d32c8" ,Valor:0.713,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T1459356762d3377" ,Valor:6938.26,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T9859356762d3427" ,Valor:6584.17,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T4559356762d34d6" ,Valor:9726.28,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T4159356762d35a2" ,Valor:2.09,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T9059356762d3655" ,Valor:20.01,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T7759356762d3705" ,Valor:223.921,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T3359356762d37b4" ,Valor:26.997,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T5559356762d3863" ,Valor:0.905,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T0059356762d3912" ,Valor:0.869,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T2859356762d39c1" ,Valor:5252.65,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T9959356762d3a71" ,Valor:2475.14,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T2059356762d3b20" ,Valor:6045.19,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T6359356762d3bd0" ,Valor:2.34,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T4459356762d3c7f" ,Valor:30.43,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T1159356762d3d2e" ,Valor:223.331,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T0259356762d3dde" ,Valor:45.939,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T5059356762d3e8e" ,Valor:0.915,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T1959356762d3f3d" ,Valor:0.903,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T5659356762d3fec" ,Valor:9261.69,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T1459356762d409c" ,Valor:4074.03,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T6859356762d414b" ,Valor:10259.6,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T1959356762d41fa" ,Valor:2.22,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T2759356762d42a9" ,Valor:18.25,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T4359356762d4358" ,Valor:223.859,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T8759356762d4407" ,Valor:387.732,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T2759356762d44b6" ,Valor:116.294,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T7459356762d4579" ,Valor:0.824,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T8359356762d4632" ,Valor:0.214526,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T8359356762d46e8" ,Valor:13133.3,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T7959356762d479c" ,Valor:26031.1,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T4859356762d4851" ,Valor:49.88,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T2059356762d4905" ,Valor:17.792,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T8459356762d49ba" ,Valor:233.097,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T0459356762d4a70" ,Valor:403.734,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T0159356762d4b24" ,Valor:370.732,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T9659356762d4bd9" ,Valor:0.995,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T0059356762d4c8d" ,Valor:80337.4,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T6359356762d4d42" ,Valor:23043.6,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T8159356762d4df6" ,Valor:83082.2,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T6759356762d4eab" ,Valor:50.07,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:52:00" ,id_variable: "T8959356762d4f5f" ,Valor:90.1,id_canal:14,id_datalogger:22},
```

{ fecha_hora: "2017-06-0812:53:00" ,id_variable: "T6359356762d3007" ,Valor:21.3125,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:53:00" ,id_variable: "T1659356762d30b9" ,Valor:224.484,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:53:00" ,id_variable: "T1359356762d3169" ,Valor:43.386,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:53:00" ,id_variable: "T7859356762d3219" ,Valor:0.721,id_canal:14,id_datalogger:22},
{ fecha_hora: "2017-06-0812:53:00" ,id_variable: "T6659356762d32c8" ,Valor:0.708,id_canal:14,id_datalogger:22},
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var db = db.getSiblingDB('capturasDB2');
db.capturas.getIndexes();
db.capturas.ensureIndex({id_variable:1})
var countl = db.capturas.count();
var i = 0;
var before= new Date();
for (i=0;i<50;i++){
	db.capturas.insertMany(myobj,function(err,object){
		if (err){
			printjson(err.message);  // returns error if no matching object found
		}else{
			printjson("No hay error");
		}
	});
};
var after = new Date();
var execution_mills= after-before;
```

```
var countF = db.capturas.count();
var count = countF-countI;
printjson("Elementos insertados:"+ count);
printjson("Tiempo mills:"+ execution_mills);
printjson("Elementos finales en DB capturas:"+ countF);
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var fLen = id_variableT.length;
for (i=0;i<fLen;i++){
        db.capturas.deleteMany(id_variableT[i]);
};
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2.1.2.- Delete

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var myobj = [{$set: {id_canal:11}}];
var element = db.capturas.find(id_variableT[4]);
var db = db.getSiblingDB('capturasDB2');
db.capturas.getIndexes();
db.capturas.ensureIndex({id_variable:1})
var i, id, countF, count;
var fLen = id_variableT.length;
var countI = db.capturas.count();
var before= [];
var after= [];
var element1= [];
var num = [];
var execution_mills = [];
for (i = 0; i < fLen; i++) {
try {
   num[i] = db.capturas.find(id_variableT[i]).count();
   printjson(id_variableT[i]);
   before[i] = new Date();
   db.capturas.deleteMany(id_variableT[i]);
   after[i] = new Date();
   execution_mills[i]= after[i]-before[i];
   element1[i] = db.capturas.find(id_variableT[i]).count();
} catch (e) {
   print(e);
}
}
countF = db.capturas.count();
count = countF-countI;
printjson("Elementos antes de eliminar:"+ num);
printjson("Elementos después de eliminar:"+ element1);
printjson("Tiempo mills:"+ execution_mills);
```

2.1.3.- Update

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];
var myobj = [{$set: {"id_canal":30}}];
var db = db.getSiblingDB('capturasDB2');
var element = db.capturas.find({"id_variable": "T5559356762d3863"});
db.capturas.getIndexes();
db.capturas.ensureIndex({id_variable:1})
var countI = db.capturas.count();
var fLen = id_variableT.length;
var before= [];
var before1 = new Date();
var after= [];
var execution_mills = [];
for (i = 0; i < fLen; i++) {
try{
      printjson(id_variableT[i]);
      before[i] = new Date();
      db.capturas.update(
       id_variableT[i],
         {$set: {"fecha_hora": "2018-06-20
13:02:00","Valor":1111,"id_canal":22,"id_datalogger":3333}},
         {"multi": true}
      );
    after[i] = new Date();
    execution_mills[i]= after[i]-before[i];
      printjson(execution_mills[i]);
} catch(e){
      printjson(e);
}
```

```
}
var after1 = new Date();
var execution_mills= after-before;
var countF = db.capturas.count();
var count = countF-countI;
var execution_mills1 = after1 - before1;
printjson("Elementos actualizado:"+ countI);
     printjson("Tiempo mills:"+ execution_mills1);
```

2.2.- Sharding

2.2.1.- Insert

```
var myobj=[
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];
var db = db.getSiblingDB('capturasDB2');
sh.enableSharding("capturasDB2");
sh.setBalancerState(true);
db.capturas.getIndexes();
db.capturas.ensureIndex({id_variable:1})
sh.shardCollection("capturasDB2.capturas",{id_variable:1});
sh.stopBalancer();
var state = sh.getBalancerState();
var countI = db.capturas.count();
var i = 0;
var before= new Date();
for (i=0;i<2275;i++){
	db.capturas.insertMany(myobj,function(err,object){
		if (err){
			printjson(err.message);  // returns error if no matching
object found
		}else{
			printjson("No hay error");
		}
	});
};
var after = new Date();
var execution_mills= after-before;
var countF = db.capturas.count();
var count = countF-countI;
printjson("Elementos insertados:"+ count);
printjson("Tiempo mills:"+ execution_mills);
printjson("Elementos finales en DB capturas:"+ countF);
sh.startBalancer();
```

2.2.2.- Delete

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var myobj = [{$set: {id_canal:11}}];
var element = db.capturas.find(id_variableT[4]);
var db = db.getSiblingDB('capturasDB2');
sh.enableSharding("capturasDB2");
sh.setBalancerState(true);
db.capturas.getIndexes();
db.capturas.ensureIndex({id_variable:1})
sh.shardCollection("capturasDB2.capturas",{id_variable:1});
sh.stopBalancer();
var state = sh.getBalancerState();
var i, id, countF, count;
var fLen = id_variableT.length;
var countI = db.capturas.count();
var before= [];
var after= [];
var element1= [];
var num = [];
var execution_mills = [];
for (i = 0; i < fLen; i++) {
try {
   num[i] = db.capturas.find(id_variableT[i]).count();
   printjson(id_variableT[i]);
   before[i] = new Date();
   db.capturas.deleteMany(id_variableT[i]);
   after[i] = new Date();
   execution_mills[i]= after[i]-before[i];
   element1[i] = db.capturas.find(id_variableT[i]).count();
} catch (e) {
   print(e);
}
}
countF = db.capturas.count();
count = countF-countI;
printjson("Elementos antes de eliminar:"+ num);
printjson("Elementos después de eliminar:"+ element1);
```

```
printjson("Tiempo mills:"+ execution_mills);
     sh.startBalancer();
```

2.2.3.- Update

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var myobj = [{$set: {"id_canal":30}}];
var db = db.getSiblingDB('capturasDB2');
var element = db.capturas.find({"id_variable": "T5559356762d3863"});
sh.enableSharding("capturasDB2");
sh.setBalancerState(true);
db.capturas.getIndexes();
db.capturas.ensureIndex({id_variable:1})
sh.shardCollection("capturasDB2.capturas",{id_variable:1});
sh.stopBalancer();
var state = sh.getBalancerState();
var countI = db.capturas.count();
var fLen = id_variableT.length;
var before= [];
```

```
var before1 = new Date();
var after= [];
var execution_mills = [];
for (i = 0; i < fLen; i++) {
try{
      printjson(id_variableT[i]);
      before[i] = new Date();
      db.capturas.update(
       id_variableT[i],
         {$set: {"id_canal":5555}},
         {"multi": true}
      );
    after[i] = new Date();
    execution_mills[i]= after[i]-before[i];
      printjson(execution_mills[i]);
} catch(e){
      printjson(e);
}
}
var after1 = new Date();
var execution_mills= after-before;
var countF = db.capturas.count();
var count = countF-countI;
var execution_mills1 = after1 - before1;
printjson("Elementos actualizado:"+ countI);
printjson("Tiempo mills:"+ execution_mills1);

     sh.startBalancer();
```