Load Balancing of Kitchens Update Meeting-2

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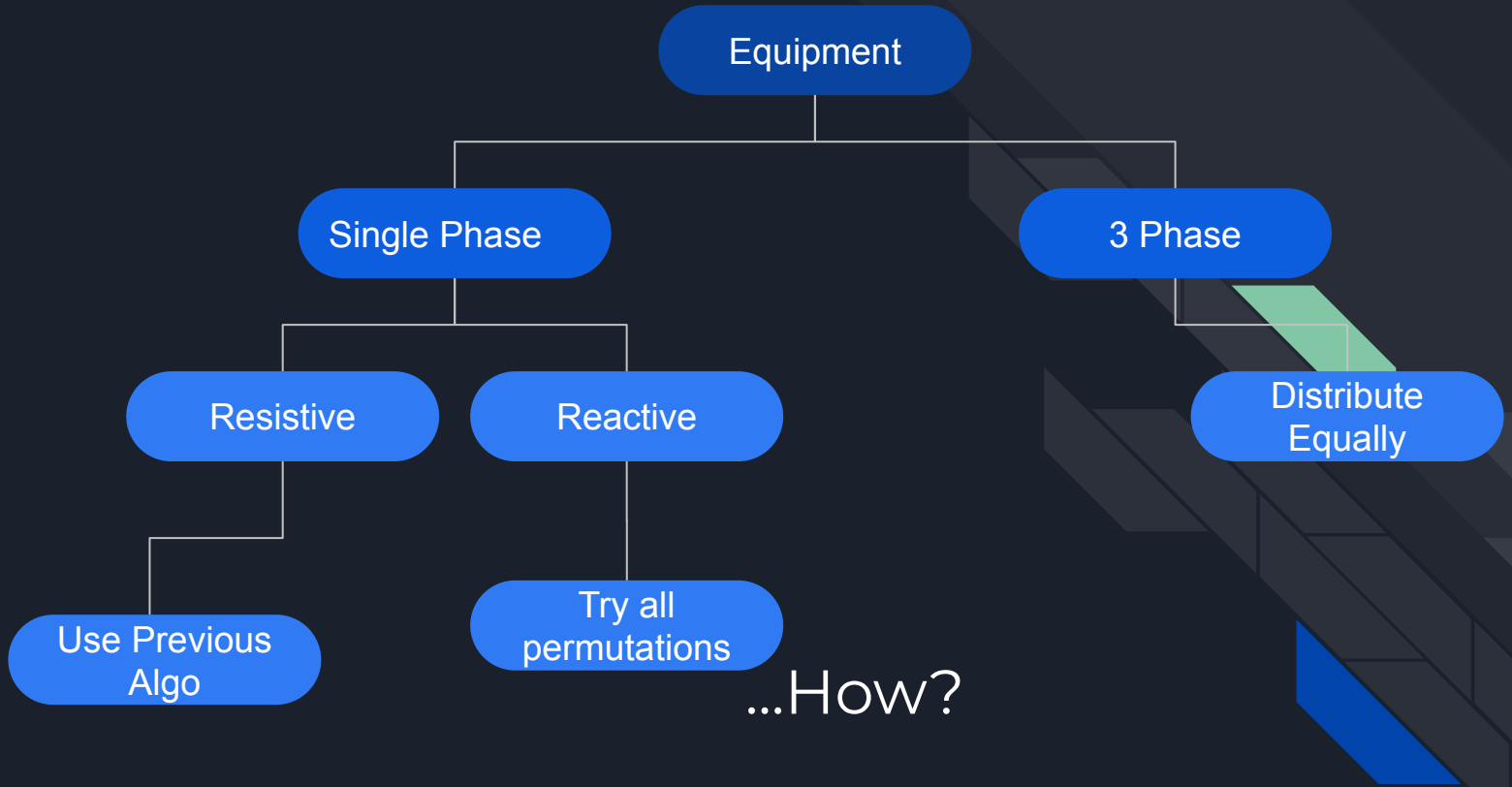
Review

- What is 3 phase power?
- What is Load Balancing?
- Need for Load balancing with the help of simulations
- Algorithm for Load Balancing of Resistive Loads

Version 5 - Resistive + Reactive Loads



We know that that we have 3^N permutations

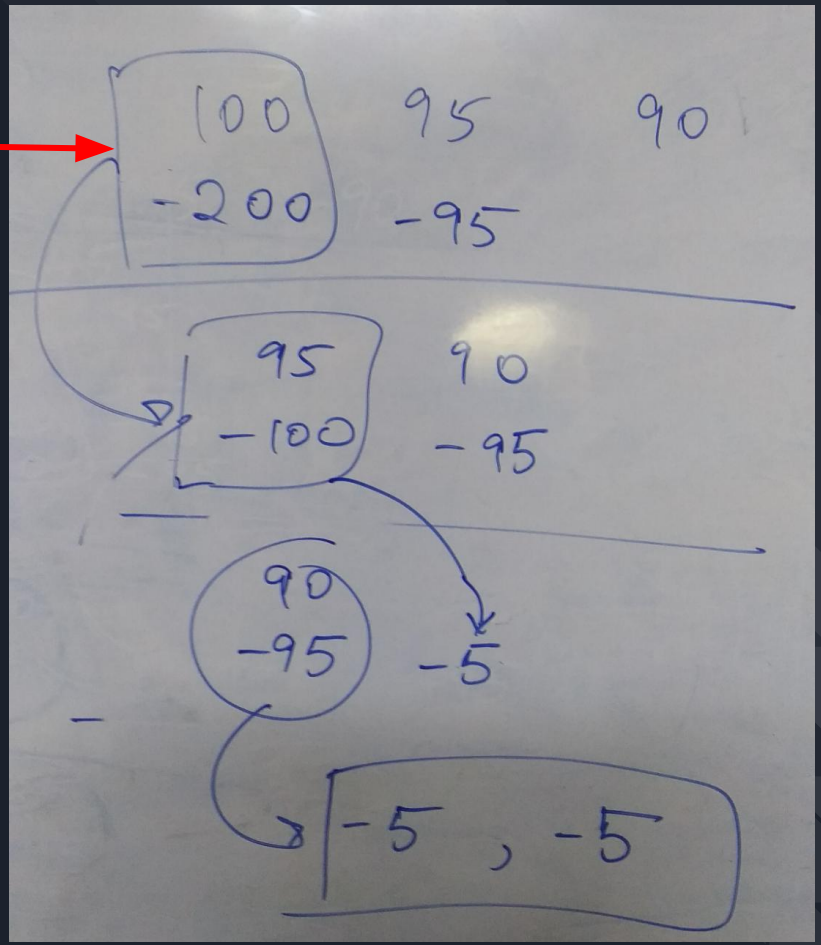
Count Numbers of Base 3

Count 3^N such Numbers
Where N is no. of reactive elements

E.g. N=4

Any one number: 0121

Admittance



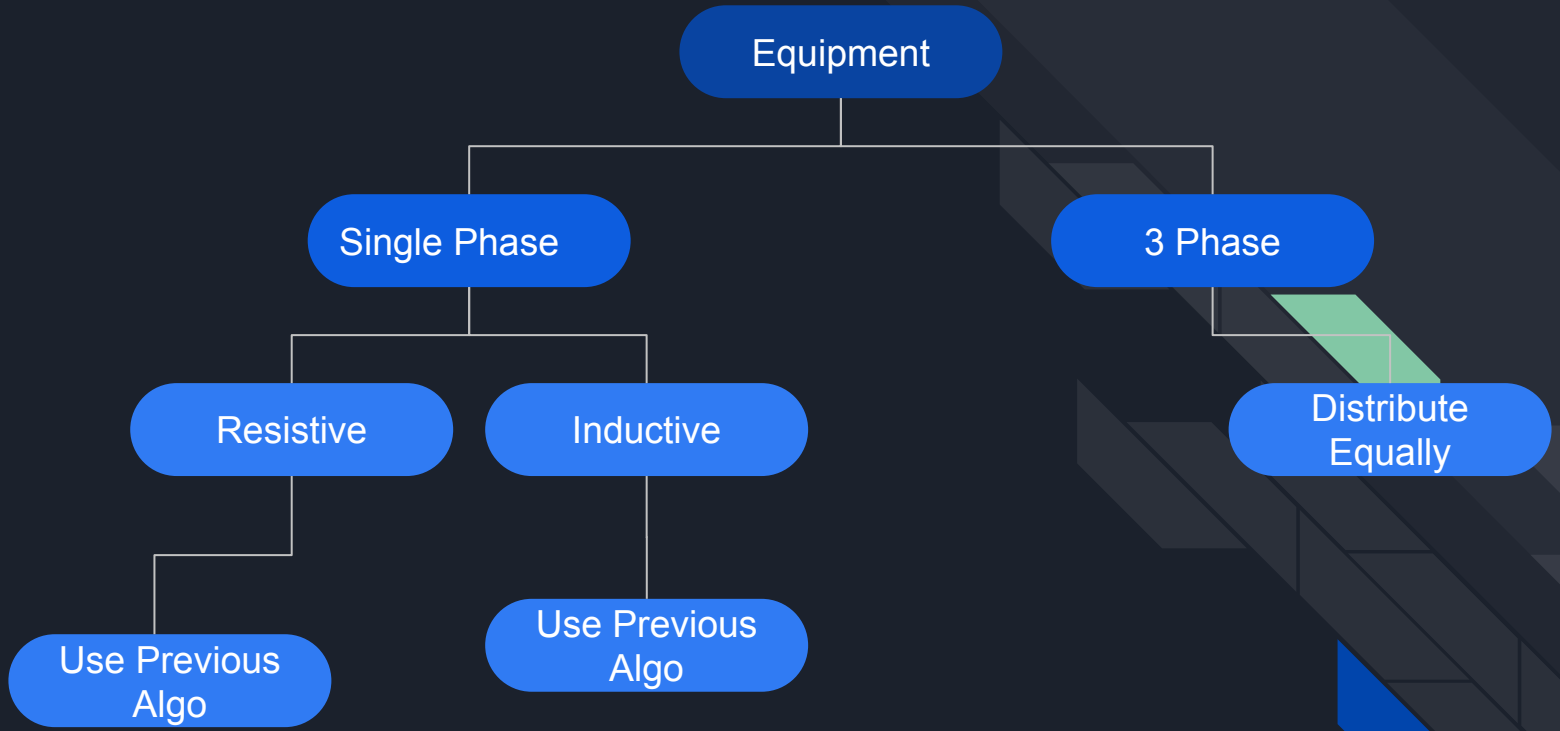
Not Scalable

Better Algorithm?

Complicated to Code

Not Useful in Real Life
No Capacitive Elements

Version 6 - Resistive + Inductive Loads



Completely Scalable

Mixed Loads

Version 7
Resistive, Capacitive, Inductive and Mixed Loads

To get Best Balance Schema: Try all permutations

Not Scalable
Use a completely different approach

Steps:

1. Obtain the admittance of all the equipment
2. arrange them in descending order of their magnitude.
3. We know that the sum of all admittance is constant and admittance on each phase should tend to avg value = (this sum)/3.
4. Maintain 3 variables:
   Error_in_x
5. The algorithm allocates each impedance to the 3 phases one by one and checks which error is reduced the most. That phase is finally allocated the impedance.

Changing the order will change the allotment.

Further Updates the the answer:

1. After first allotment of elements we again run through all elements one by one 5 times.
2. We temporarily relocate an element in the other two phases one by one and check the cost.

   Cost = $|Z1-Z2| + |Z2-Z3| + |Z1-Z3|$
3. If the cost is lesser than the previous we shift the element to the other phase permanently.

**This algorithm does not guarantee the perfect balancing schema as we are not trying all the permutations, yet the answer is extremely close or at times equal to the best case.

	A	B	C	D	E	F	G
1	Machine/Fixture	Variable Name	Qty	Single/Three Phase	Power at Peak (kVA)	Power Factor	eading/Lagging
2	A		1	1	10	1	
3	B		1	1	10	0	Lagging
4	C		1	1	10	1	
5	D		2	1	10	0	Lagging
6	E		1	1	10	1	
7	F		1	3	10	0	Leading
8							
9							

```
######################## Load Balance Results ####################
Equipment on R - Phase:
A
D
F (3-ph)
-----------------------
Equipment on Y - Phase:
B
C
F (3-ph)
-----------------------
Equipment on B - Phase:
D_2
E
F (3-ph)
########################## PHASE CURRENTS ########################
(For perfectly balanced load the magnitude of currents should be equal and the angles should be 120 apart)
Current drawn from R-Phase: 101.64∠63.43 A
Current drawn from Y-Phase: 101.64∠183.43 A
Current drawn from B-Phase: 101.64∠303.43 A
############################    END    ##########################
```

Finishing Up

Generating Executables

Making of the Report

Questions/Suggestions/Feedback ??

Thank You!