Capacitance, charge and potential of a charged body with respect to earth -

A charged body when earthed becomes neutral, that is there is charge flow, so there must me a potential difference of the electrons that flow, the determination of the intensity and change in P.D and so the current can be said same as in the case of charge induction; though with a bit replacement of words --

In a charged conductor, electrons are deficient/in excess, now as this deficiency increase the kernels/electrons enter a higher state of instability, or they posses high energy, as a result cause of the repulsive fores among the electrons/kernels (in case of kernels the repulsive forces can be reduced by taking in electrons from earth; or since the charge is exposed, electrons from earth will get drawn towards it), when its contacted with earth, there's a certain velocity at which it will flow to/from earth which consequently becomes higher as the charge density on the metal increases, and this velocity defines the potential difference, which again defines the current.

Now this P.D is not constant throughout the discharge process, it decreases as the charge flows out; reason being the fact that since the electrons will reduce in number/ the kernels will get satisfied by electrons during the discharge process, the repulsion/attraction will too reduce (in case of kernels it will be reduced cause the net charge will be reduced) decreasing the P.D of each electron and so the current.

The final analogy that can be taken here is that the instantaneous potential of the electrons net charge is directly proportional to the charge density on the body -

$$Q \alpha V$$

We're gonna add a constant here - $Q=CV$

Its to be noted that the relation between Q and V here is for a conductor and not for the sake of comparison of many conductors, if its done so it will be wrong cause the P.D is dependent on the charge density and not the net charge 'Q'.

So this relation ($Q \alpha V$) is to denote the drop or increment in V as Q varies with time (usually decreases).

See what happening here...is that Q/V is a constant for every conductivity...so if its like 1:500 (that is for 1 C charge stored the potential will be 500)...then it means that as q decreases, V decrease by a very large amount (so if Q falls even by a bit...like .2, the V will fall major) as compared to a conductor of ratio 500:1 (that is 500 C of charge make up 1 V and if Q falls by a large amount V wont fall that much). This is nothing but a consequence of the fact that Q and V are directly proportional.

Q/V is the capacitance, or it can be said that capacitance is a measure of the ability of a conductor to store a charge with certain amount of P.D (Capacitance will increase as the charge stored per unit potential increases) or a measure of deviation of P.D (lower the deviation higher the capacitance) per unit fall in charge OR a a measure of deviation in the total charge stored per unit fall in P.D (Higher the deviation, more is the capacitance).

What C does here is make this relation $Q \alpha V$ suitable for all conduct (and therefore of some use) by knowledge of 'C' for that individual conductor.

So higher the capacitance, higher the tendency of the conduct to become a constant voltage source, similarly, lower the capacitance higher will be the tendency of the conductor to approach a constant voltage source.

Now it has been seen that higher the capacitance larger is the conductor...why is this so? That's cause for a constant charge density, the fall in potential per unit fall in charge is less (so of course by definition of capacitance, its capacitance will be high).

Suppose we take 2 charged conductors having equal charge density in the form of plates, one having an area 2A and the other A, so now if certain amount of net charge...like 'd' charge flows though both the conductors, the potential drop is A will be much higher than in 2A cause even if 'd' charges flow from 2A, it will reduce the net charge by 'd' amount, and but still there will be a lots of unsatisfied charges (extra electrons as compared to natural charge density of a metal) left in the conduct that converts to more repulsion and so higher potential difference; where as if this d flows from the A, the amount of charge remaining in A will be lower than 2A, that means less number of unsatisfied charges and so lower potential. This is the reason for the higher capacitance of larger bodies.

Taking the ordeal of charging conducts of difference capacitance or area, for a conduct having a specific capacitance, as the charge on it increases, so does its P.D, that is if the charging source is maintained at a constant potential, as the charge on the conductor increases, it will approach the potential difference of that charging source...now this potential (and so the charge) that the charging source 'feels' might not actually be the net potential (or charge) on the charged conductor, it depend on what sort of conduct, rather what's the arrangement of the conductor.

Value of capacitance can be also set for a battery...or in that case any conduct...or even an arrangement of conducts.