

- 2) After translation, all of the new Object B octrees are fully expanded to a depth of 9 (8 digits): rxxxxxxxxx. Translated Object B can be referred to as Object B' (B' = B prime).

Since Object A + Object B' are expanded to the same depth, finding the intersection is as simple as finding sequences in Object B' that are identical to sequences in Object A. In Python it was simply converting the lists to hashable objects and using the intersection operator (&) which compares the hashes of the sequences in both objects. If the hashes are identical, there is an intersection.

If there is an intersection, the volume can be found by multiplying the cubed length of the node by the number of intersecting nodes. The length of the nodes is determined by successively halving the parents length. For our case, the length of the nodes being compared was  $100/2^8 = .391\text{cm}$ . This means the volume is  $m * (100/2^8)^3$  where m is the number of intersection nodes. In our problem, there were zero intersections making  $m = 0$  and the intersecting volume also zero ( $V = 0$ ).