# Some Problems On Apollonian Gasket

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**Abstract**

I proposed some problems on Apollonian gasket configuration

Consider $ABC$ be a triangle, construct three circles $(A)$, $(B)$, $(C)$ such that them tangent to each other. Let $(A_1)$ is the circle tangent to the Soddy circle and $(B)$ and $(C)$, let $(A_{k+1}$ is the circle tangent the $(A_k)$ and $(B)$ and $(C)$ for $k = 2, 3, ...n$ define $(B_i)$, $(C_i)$ cyclically. We have some problems in next pages.

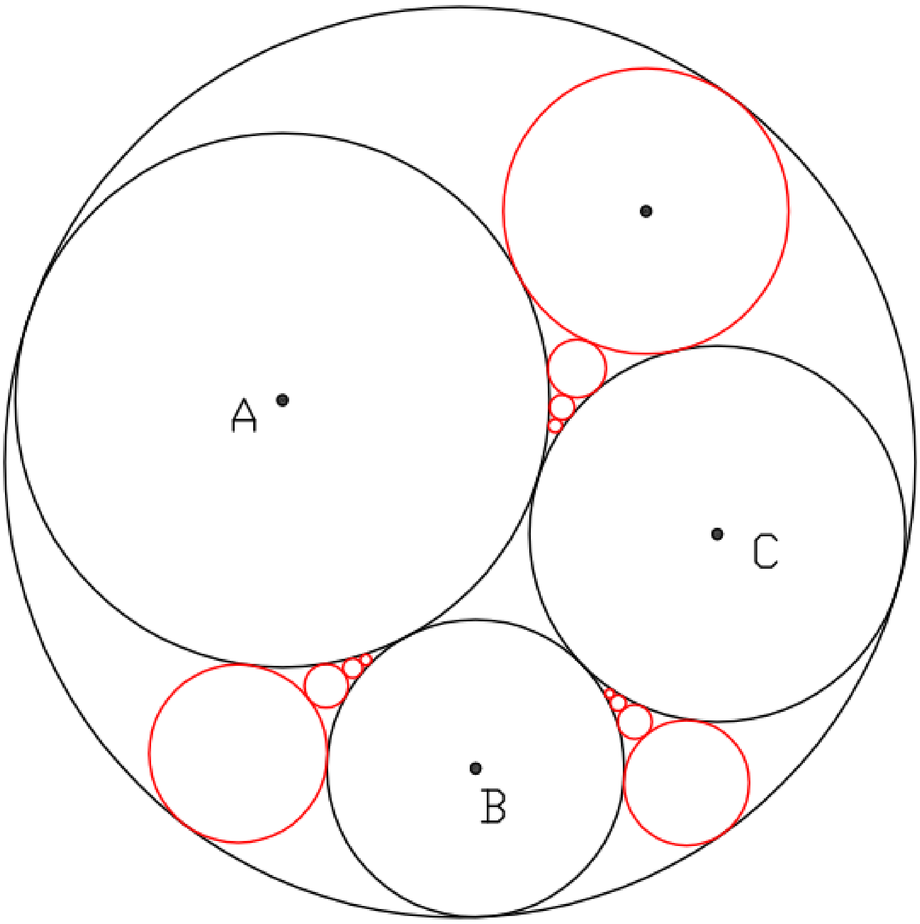


Figure 1

**Problem 1.** Three lines $A_jA_k$, $B_jB_k$, $C_jC_k$ are concurrent for any $j \neq k, j, k = 1, 2, ..., n$ (Figure 2) .

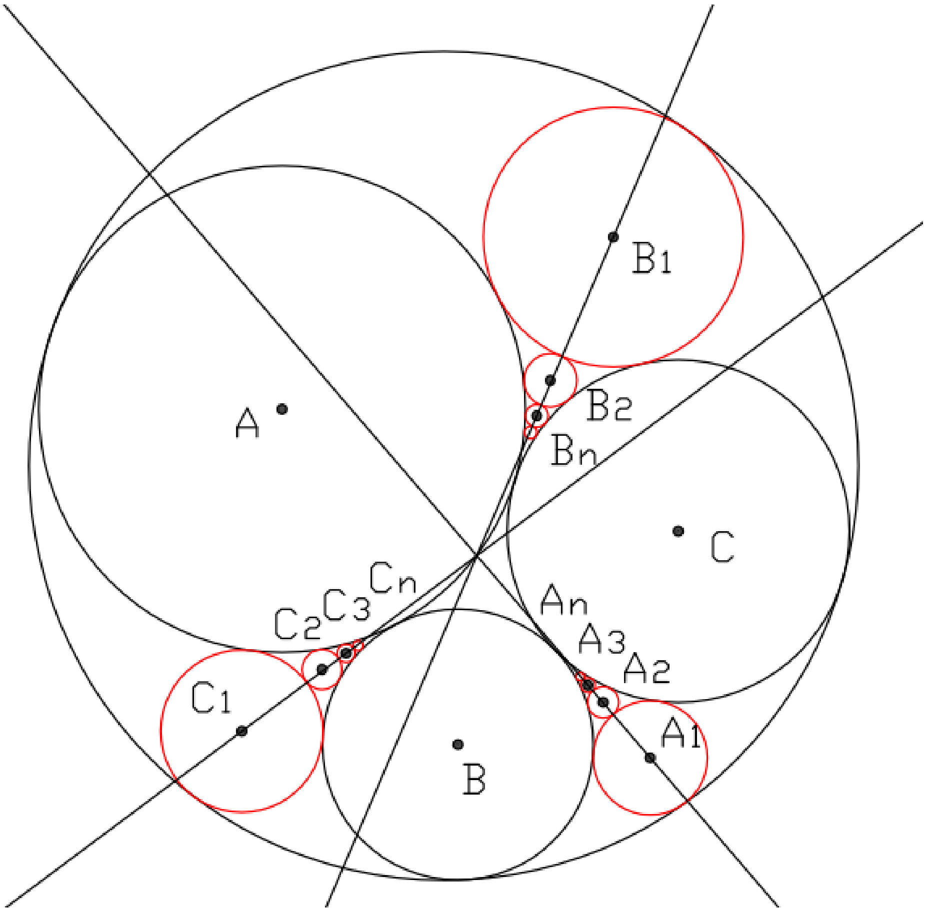


Figure 2

**Problem 2.** Three line $AA_k$, $BB_k$, $CC_k$ are concurrent, for $k = 1, 2, ..., n$

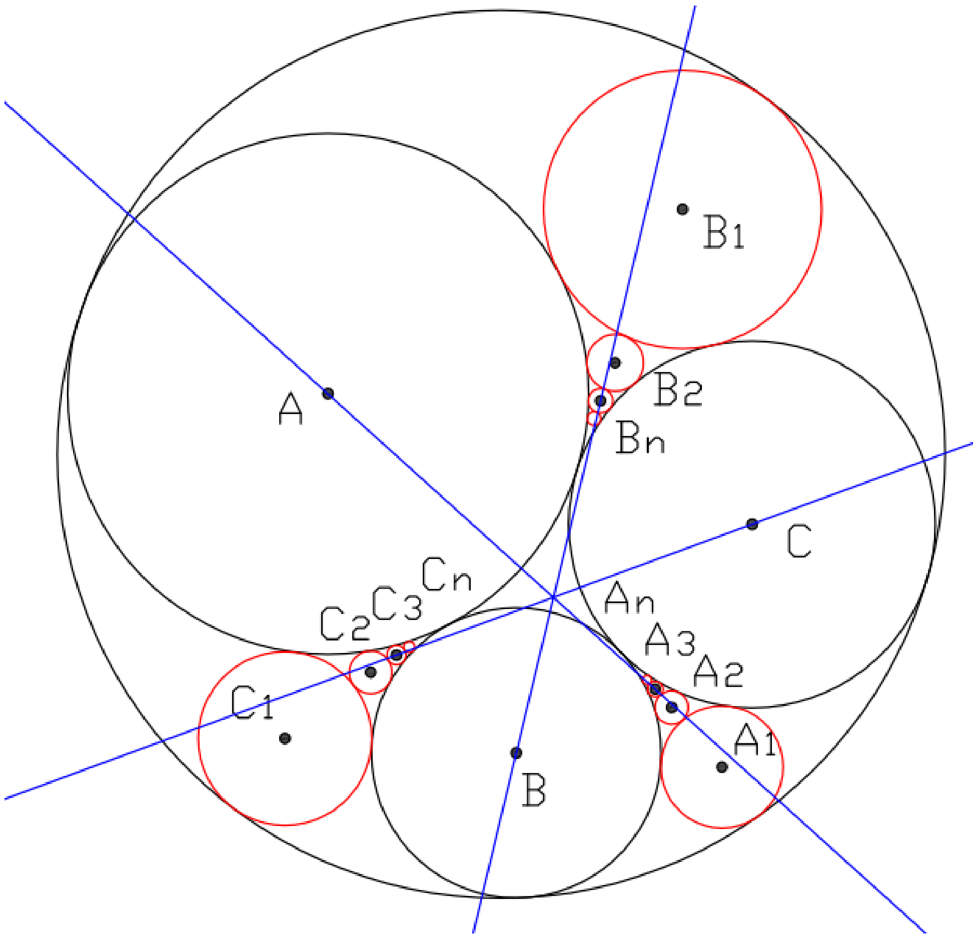


Figure 3

**Problem 3.** Let $(A)$ tangent to $(B_k)$, $(C_k)$ at $A_{ck}$, $A_{bk}$. Define $B_{ck}$, $B_{ak}$, $C_{ak}$, $C_{bk}$ cycliclly. Then six points $A_{bk}$, $A_{ck}$, $B_{ck}$, $B_{ak}$, $C_{ak}$, $C_{bk}$ lie on a circe for $k = 1, 2, ..., n$. and the centers of these new circles lie on a line.

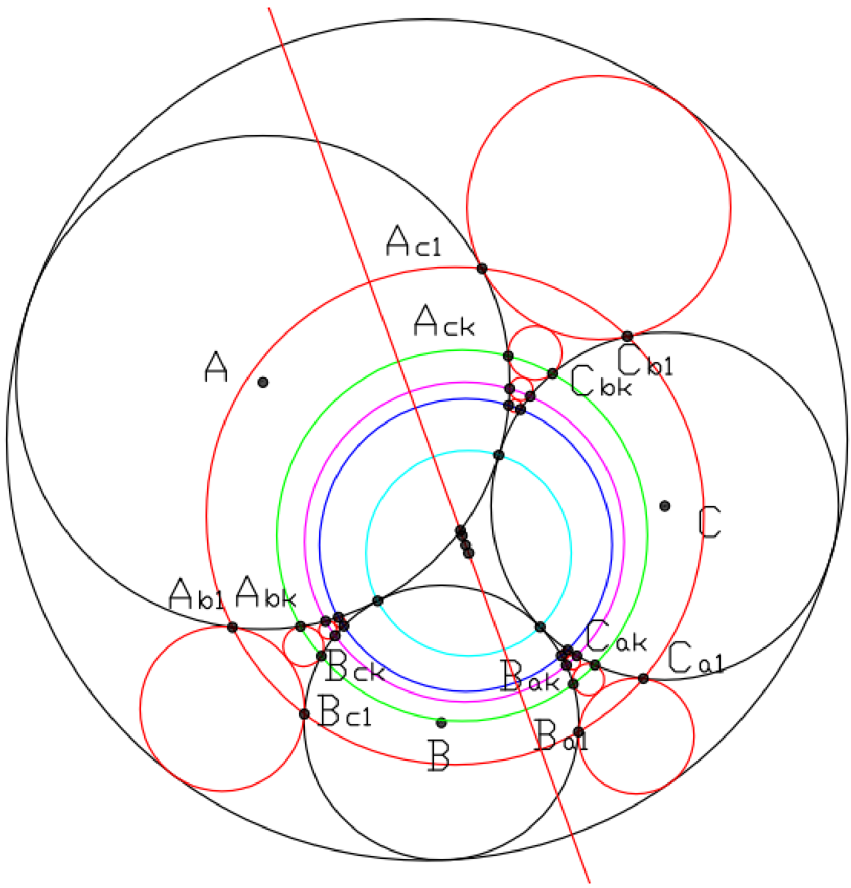


Figure 4

**Problem 4.** Let $(A_k)$ tangent to $(A_{k+1})$ at $T_{ak}$, define $T_{ak}$, $T_{ck}$ cyclically. Then three lines $T_{aj}Tak$, $T_{bj}T_{bk}$, $T_{cj}T_{ck}$ are concurrent for any $j \neq k, j, k = 1, 2, ..., n$.

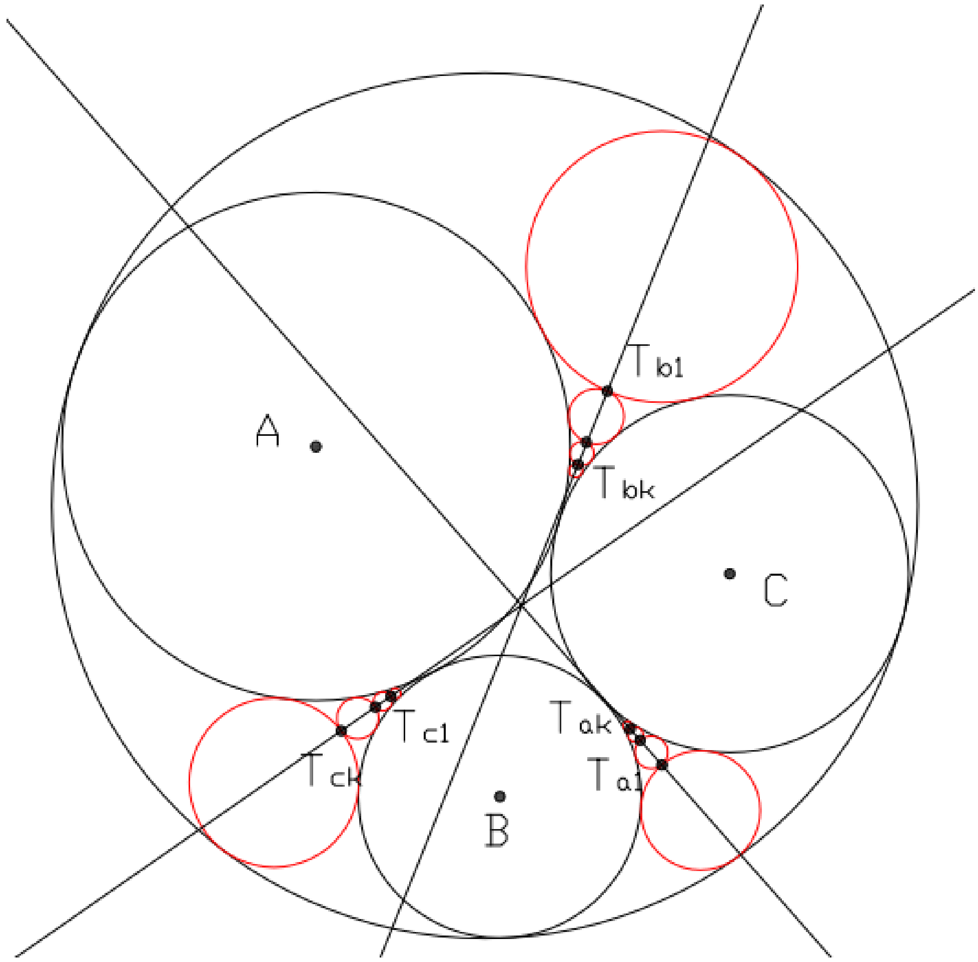


Figure 5

**Problem 5.** Circle $(T_{ak}T_{bk}T_{ck})$ tangent to six circles $(A_k)$, $(A_{k-1})$, $(B_k)$, $(B_{k-1})$, $(C_k)$, $(C_{k-1})$ any $k = 1, 2, ..., n$.

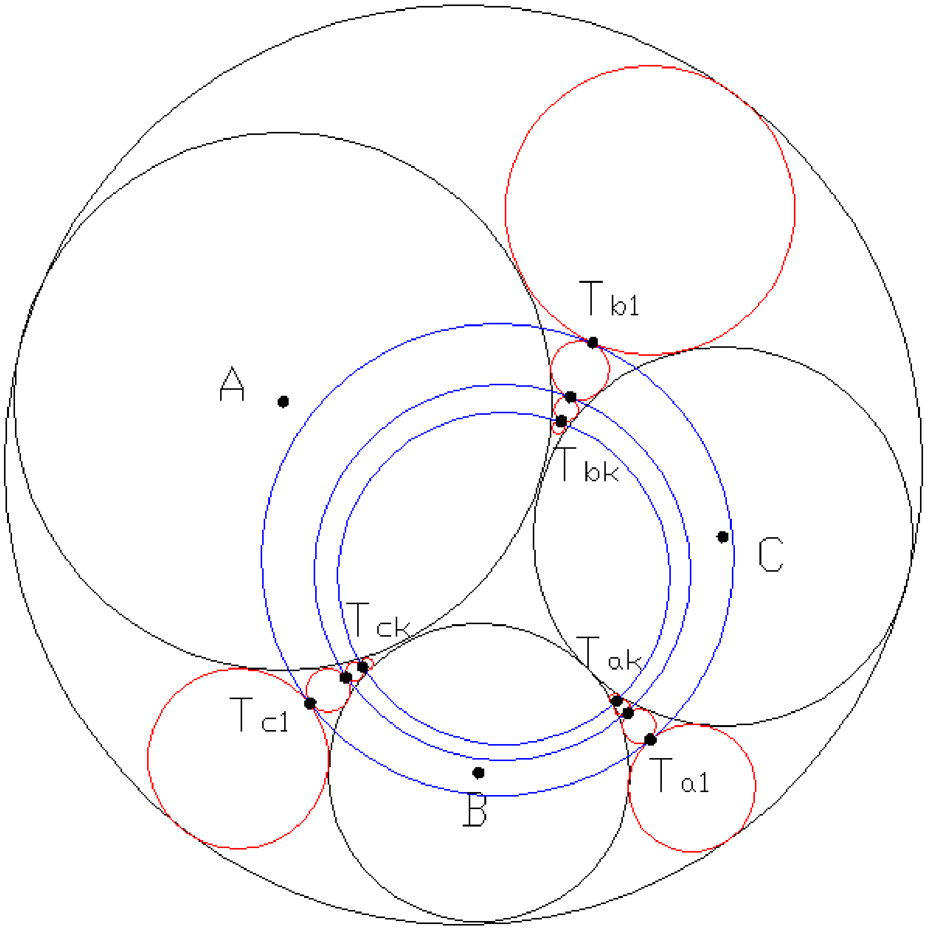


Figure 6

**Problem 6.** Three lines $AT_{ak}$, $BT_{bk}$, $CT_{ck}$ are concurrent, for any $k = 1, 2, ..., n$.

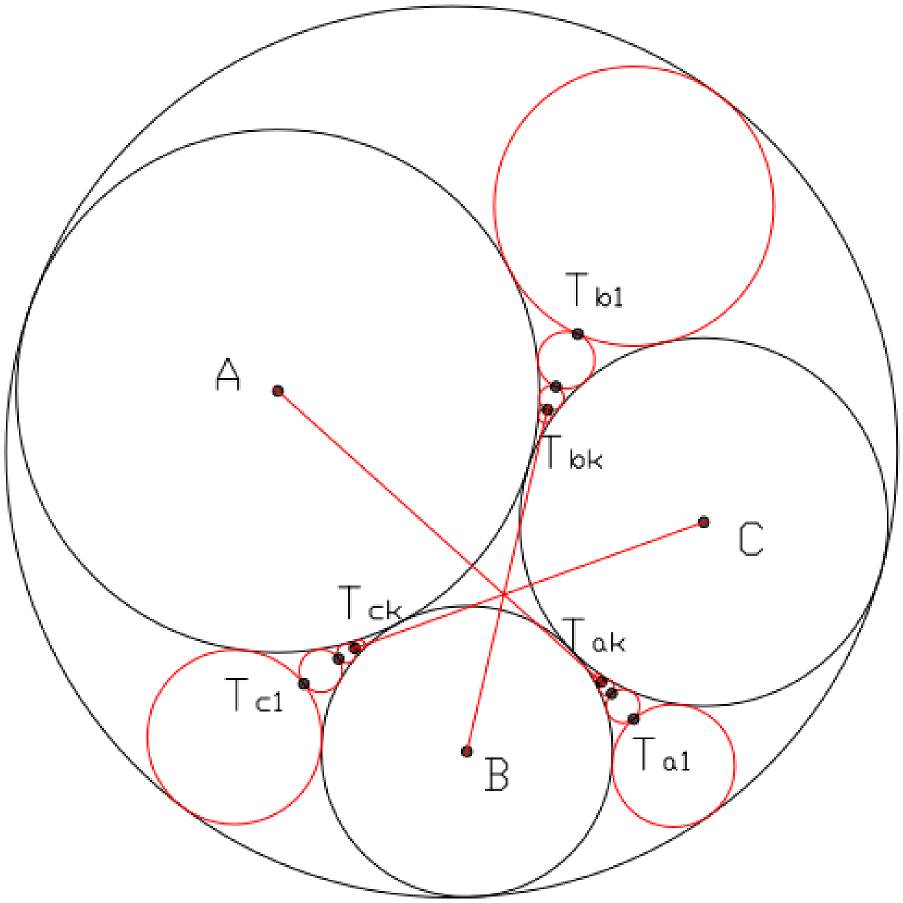


Figure 7

**Problem 7.** Three lines $A_jT_{ak}$, $B_jT_{bk}$, $C_jT_{ck}$ are concurrent for any $j, k = 1, 2, ..., n$.

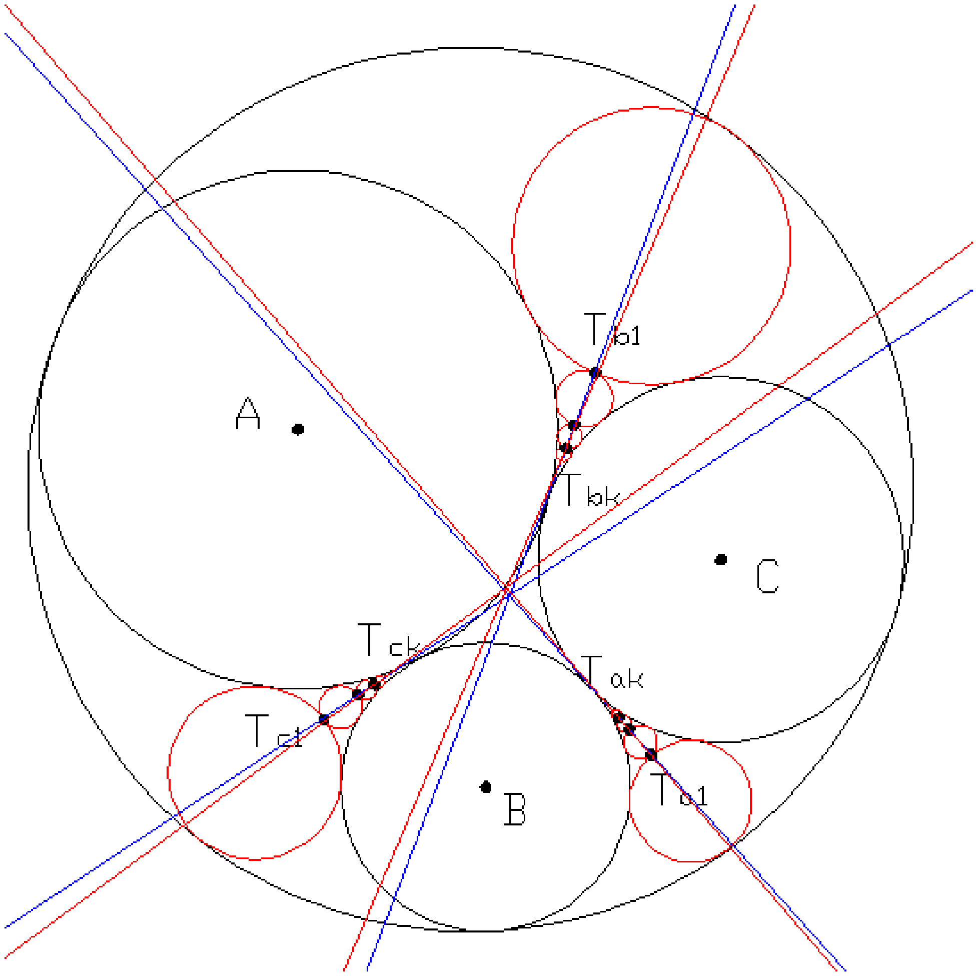


Figure 8

## References


[1] Apollonian gasket, `https://en.wikipedia.org/wiki/Apollonian_gasket`

[2] `https://artofproblemsolving.com/community/c6h555078p3225247`



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