CH10_008

TORQUE MATH #2 BOXES

1 Ray Collision Against A Box

Finished Code:

```cpp
#include "console/simBase.h"

// 1 - Include this directory to get ALL math features
#include "math/mMath.h"

ConsoleFunction(ch10_exer_008, bool, 5, 5,
                "ch10_exer_008( start , end, min, max )")
{
    Point3F rayStart;
    Point3F rayEnd;

    Point3F boxMin;
    Point3F boxMax;

    // 2 - Copy ray start and end data into the provided variables
    dSscanf(argv[1], "%f %f %f", &rayStart.x, &rayStart.y, &rayStart.z);
    dSscanf(argv[2], "%f %f %f", &rayEnd.x, &rayEnd.y, &rayEnd.z);

    Con::printf("Ray start => %f %f %f",
                rayStart.x, rayStart.y, rayStart.z );
    Con::printf("Ray end   => %f %f %f",
                rayEnd.x, rayEnd.y, rayEnd.z );

    // 3 - Copy box min and max data into the provided variables
    dSscanf(argv[3], "%f %f %f", &boxMin.x, &boxMin.y, &boxMin.z);
    dSscanf(argv[4], "%f %f %f", &boxMax.x, &boxMax.y, &boxMax.z);
```

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```
   Con::printf("Box min => %f %f %f",
               boxMin.x, boxMin.y, boxMin.z );
   Con::printf("Box max => %f %f %f",
               boxMax.x, boxMax.y, boxMax.z );


   // 4 - Define a new box.
   Box3F aBox( boxMin, boxMax );


   // 5 - Verify that the box was defined properly
   if( ! aBox.isValidBox() )
   {
      Con::errorf("The box min and max points were not defined properly.",
                  " Try again.");
      return false;
   }


   // 6 - Check for a collision and print the location of that collision
   //     if there is one
   F32     collisionPos;
   Point3F collisionNormal;
   if( aBox.collideLine( rayStart, rayEnd ,
                         &collisionPos, &collisionNormal ) )
   {
      Point3F collisionPoint;
      collisionPoint.interpolate( rayStart, rayEnd , collisionPos );
      Con::printf("Our ray collided with the box at point location ",
                  "<%f %f %f>",
                  collisionPoint.x, collisionPoint.y, collisionPoint.z);


      return true;
   }


   Con::printf("No collision occurred between our box and the ray");
   return false;
}
```

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Answers:

1. This happened, because we used the Box3F constructor that takes Point3F arguments to initialize box min and max. This constructor, by default, checks to be sure that min and max are in the correct order and will swap them if they are not.

2. Even though the box has zero volume, the ray (line) still passes through the center of the box's position in three-space, and so it registers a (mathematical) collision.