# CMotionServer_Overview

The C-Motion Server (CMS) is a network application that makes real-time hardware data available to multiple client applications using the Visual3D pipeline command language.

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## Core Features

- streaming from multiple real-time mocap hardware sources.
- basic 2-D and 3-D data visualization.
- pipeline command processing.
- connection from multiple clients applications.
- common XML mocap language broadcast over TCP and UDP networks.

## 3rd Party Real-Time Hardware Systems

CMS Supports the follow hardware systems:

AMTI Gen5 - USB - force plates
Bertec AM6x00 - USB - force plates
MAC Cortex - TCP/IP - markers and force plates
NDI First Principles - TCP/IP - markers
Qualisys Track Manager - TCP/IP - markers and force plates
Vicon DataStream (Nexus) - TCP/IP - markers and force plates

In addition, CMS can treat a C3D file as a hardware system. This is very useful for working with pre-record data.

## Visual3D Pipeline Commands

CMS supports the following subset of Visual3D pipeline commands:

Center of Pressure (COP)
Center of Mass (COM)
First Derivative
Force

Ground Reaction Force (GRF)
Joint Angle
Multiply by Constant
Subtract Signals

## Client Applications

CMS can talk to multiple client applications at one time over the network.

A client connects over TCP/IP on port 12099. This can be done on any platform (e.g., Windows, Mac OS X, Linux, iOS, Android, etc.) using any language of choice (e.g., C, C++, Java, Python, etc.). Example code is provided below.

Once connected, a client sends commands (see Common XML Motion Language below) to the server and then waits for a response. CMS responds to client commands with data and status indicators as appropriate. The client then processes and displays the results to end users.

## Common XML Motion Language

### Connect

The first XML command a client must send to CMS is the **connect** command.

Syntax:

```
<cmserver from="client">
  <connect name="clientApp" verion="1.0" date="2013-09-30" />
</cmserver>
```

Data from various hardware systems is collected in the server and then repackaged in a common XML based language.

The Server accepts a subset of the standard Visual3D pipeline commands and then applies those commands to the real-time hardware data. The results are then packaged up in a common XML based language and broadcast.

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