

Designing MCP
the Mathematical Computation
Protocol

Paul S. Wang
Institute for Computational Mathematics
Kent State University

`pwang@mcs.kent.edu`

`http://monkey.mcs.kent.edu/~pwang`

MCP Issues and Considerations

- Supporting IAMC
- Simple, powerful, and flexible
- Meeting client-to-server and server-to-client requirements
- Using different types of data-transfer encodings
- Employing stream connection between client and server
- Assuming pier-to-pier interactions

Client Requirements

- Sending computing requests
- Receiving computational results, in indicated encoding forms
- Sending control requests to server
- Receiving control responses (e.g. server status information)
- Sending client status
- Receiving requests from server
- Responding to requests from server
- Interrupting on-going computation
- Disconnecting

Server Requirements

- Receiving computing requests
- Sending computational results, in encoded forms
- Sending control requests to client
- Receiving control responses (e.g. client status information)
- Sending server status
- Responding to control requests from client
- Disconnecting

MCP Protocol

- First line:

Client MCP *version*

Server MCP *version*

- Header and body format (HTTP style)
- Header Key-value pairs (HTTP style)

Available Keys

- **Status:** normal, error, ready, busy, terminating
- **ControlRequest:** *type*, optional
- **ControlResponse:** *type*, optional
- **Sequence:** linear sequence number (control and compute sequenced separately)
- **Content-Type:** body type (e.g. application/x-mp, or text/MathML) default text/plain
- **Content-length:** bytes
- **Transfer-Encoding:** if any, default none (useful for email transfer)

Example Client Computation Request

Client MCP 1.0

Status: normal

Sequence: 1

Content-Type: application/x-mp

Content-length: 356

Body

Example Server Computation Response

Server MCP 1.0

Status: normal

Sequence: 1

Content-Type: application/x-mp

Content-length: 4000

Body

Example Client Control Request

```
Client MCP 1.0  
Status: normal  
ControlRequest: disconnect  
Sequence: 7
```

Example Server Control Response

```
Server MCP 1.0  
Status: normal  
ControlResponse: Bye  
Sequence: 7
```

Example Server Cookie

Server MCP 1.0

Status: normal

ControlRequest: SetCookie

Sequence: 1

Content-type: application/binary

Body

Example Client Cookie

```
Client MCP 1.0  
Status: normal  
ControlRequest: Cookie  
Sequence: 1
```

Body

Server to Client Requests

- Prompts for input from the user
- Choices for user/client selection
- Dialogue for user/client input
- Setting Cookie
- Disconnecting