

ECE 531

Introduction to the Internet of Things

Junchao Mei

Assignment 5

Communication in the Cloud

A handwritten signature in black ink that reads "Junchao Mei". The signature is written in a cursive, flowing style with a large loop for the 'J' and a distinct 'Mei' at the end.

[HTTP Requests]	[Database Operations]
GET: request displaying a file on server	Create: insert a row to database
POST: request sending data to server	Read: display data in database
PUT: request creating/updating a file on server	Update: update a row in database
DELETE: request deleting a file on server	Delete: delete a row in database

My design: ✓ are implemented and tested.

	Database				File on server			
	insert	select	update	delete	create	read	update	delete
GET	✓	✓	✓	✓		✓		
POST	✓	✓	✓	✓		✓		
PUT					✓		✓	
DELETE								✓
File on server	✓	✓	✓	✓				

url parameters for **hw5.php** (separated by '&' in GET request and file-to-read):

url parameter	domain	default value
file	string	(none)
id	integer	(none)
name	string (length<=50)	(none)
major	string (length<=100)	(none)
note	string (length<=100)	(none)
operation	{'i', 's', 'u', 'd'}	's'

file permissions:

file	permission	chmod code	location	owner
hw5.php	r-----	400	/var/www/html/loT/hw5/	www-data
DBcredential.php	r-x-----	500	/var/www/	www-data
toDelete.txt	rw-rw-rw-	777	/var/www/html/loT/hw5/	www-data
newTest.sh	--x--x--x	111	/var/www/html/loT/hw5/	www-data
reCreateTable.sql	r--r--r--	444	/var/www/html/loT/hw5/	www-data

Default method used by curl: GET

Default operation used by my program: Select

test.log -> to record cases testing

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<?php

include_once('/var/www/DBcredential.php'); // $dbms $host $dbName $user $pass $table $dsn

$hw5test = new IoWebService();
$hw5test->dbOperation();

class IoWebService
{
    private $method;
    private $operation;
    private $parameters;
    private $dbh = null;

    public function __construct()
    {
        // Input type
        $this->method = $_SERVER['REQUEST_METHOD']; // GET or POST
        echo "HTTP method: " . $this->method . "<br>\n<br>\n";

        // Database operation type
        $this->operation = 's'; // default: select
        if ($this->method == "GET")
        {
            if (array_key_exists('file', $_GET))
            {
                $this->operation = 'f';
            } else if (array_key_exists('operation', $_GET) && ($_GET['operation'] == 'i' || $_GET['operation'] == 's' ||
$_GET['operation'] == 'u' || $_GET['operation'] == 'd'))
            {
                $this->operation = $_GET['operation'];
            }
        } else if ($this->method == "POST")
        {
            if (array_key_exists('file', $_POST))
            {
                $this->operation = 'f';
            } else if (array_key_exists('operation', $_POST) && ($_POST['operation'] == 'i' || $_POST['operation'] == 's' ||
$_POST['operation'] == 'u' || $_POST['operation'] == 'd'))
            {
                $this->operation = $_POST['operation'];
            }
        }

        // Parameters
        $this->parseParameters();

        // connect database
        global $user, $pass, $dsn;
        try
        {
            $this->dbh = new PDO($dsn, $user, $pass);
            echo "mysql connect successfully<br>\n<br>\n";
        } catch (PDOException $e)
        {
            die ("Error!: " . $e->getMessage() . "<br>\n<br>\n");
        }
    }

    private function parseParameters()
    {
        if ($this->operation != 'f')
        {
            if ($this->method == "GET")
            {
                // $parameters[0] - studentID
                if (!array_key_exists('id', $_GET))
                {
                    $this->parameters[0] = 'null';
                } else
                {
                    $this->parameters[0] = $_GET['id'];
                }
                // $parameters[1] - studentName
                if (!array_key_exists('name', $_GET))
                {
                    $this->parameters[1] = 'null';
                } else
            }
        }
    }
}

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    {
        $this->parameters[1] = $_GET['name'];
    }
    // $parameters[2] - major
    if (!array_key_exists('major', $_GET))
    {
        $this->parameters[2] = 'null';
    } else
    {
        $this->parameters[2] = $_GET['major'];
    }
    // parameters[3] - note
    if (!array_key_exists('note', $_GET))
    {
        $this->parameters[3] = 'null';
    } else
    {
        $this->parameters[3] = $_GET['note'];
    }
} else if ($this->method == "POST")
{
    // $parameters[0] - studentID
    if (!array_key_exists('id', $_POST))
    {
        $this->parameters[0] = 'null';
    } else
    {
        $this->parameters[0] = $_POST['id'];
    }
    // $parameters[1] - studentName
    if (!array_key_exists('name', $_POST))
    {
        $this->parameters[1] = 'null';
    } else
    {
        $this->parameters[1] = $_POST['name'];
    }
    // $parameters[2] - major
    if (!array_key_exists('major', $_POST))
    {
        $this->parameters[2] = 'null';
    } else
    {
        $this->parameters[2] = $_POST['major'];
    }
    // parameters[3] - note
    if (!array_key_exists('note', $_POST))
    {
        $this->parameters[3] = 'null';
    } else
    {
        $this->parameters[3] = $_POST['note'];
    }
}
} else // operation = 'f'
{
    $data = array();
    // open and read file
    if ($this->method == "GET")
    {
        if (file_exists($_GET['file']))
        {
            parse_str(file_get_contents($_GET['file'], 'r'), $data);
        } else
        {
            die("File <b>".$_GET['file']. "</b> doesn't exist!<br>\n");
        }
    } else if ($this->method == "POST")
    {
        if (file_exists($_POST['file']))
        {
            parse_str(file_get_contents($_POST['file'], 'r'), $data);
        } else
        {
            die("File <b>".$_POST['file']. "</b> doesn't exist!<br>\n");
        }
    }
}
// initialize $parameters[]

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    if ($data!=null)
    {
        // $parameters[0] - studentID
        if (!array_key_exists('id',$data))
        {
            $this->parameters[0] = 'null';
        } else
        {
            $this->parameters[0] = $data['id'];
        }
        // $parameters[1] - studentName
        if (!array_key_exists('name',$data))
        {
            $this->parameters[1] = 'null';
        } else
        {
            $this->parameters[1] = $data['name'];
        }
        // $parameters[2] - major
        if (!array_key_exists('major',$data))
        {
            $this->parameters[2] = 'null';
        } else
        {
            $this->parameters[2] = $data['major'];
        }
        // parameters[3] - note
        if (!array_key_exists('note',$data))
        {
            $this->parameters[3] = 'null';
        } else
        {
            $this->parameters[3] = $data['note'];
        }
        // change $operation
        $this->operation = 's'; // default
        if (array_key_exists('operation',$data) && ($data['operation']=='i' || $data['operation']=='s' ||
$data['operation']=='u' || $data['operation']=='d'))
        {
            $this->operation = $data['operation'];
        }
    }
    $this->parameters[4] = date('Y-m-d H:i:s');
}

public function dbOperation()
{
    global $table;
    $sqlcmd = "";
    // quoting
    for ($i=1; $i<count($this->parameters) ;$i++)
    {
        if ($this->parameters[$i]!='null')
        {
            $this->parameters[$i] = "'".$this->parameters[$i]."'";
        }
    }
    // generate SQL command
    switch ($this->operation)
    {
        case 'i':
            $sqlcmd .= "INSERT INTO ".$table." (studentName, major, note, updateDate) VALUES (". $this->parameters[1].", ".
$this->parameters[2].", ". $this->parameters[3].", ". $this->parameters[4].")";
            break;
        case 'u':
            $sqlcmd .= "UPDATE ".$table." SET studentName=". $this->parameters[1].",major=". $this->parameters[2].",note=".
$this->parameters[3].",updateDate=". $this->parameters[4]. " WHERE studentID=". $this->parameters[0].";";
            break;
        case 'd':
            $sqlcmd .= "DELETE FROM ".$table." WHERE studentID=". $this->parameters[0].";";
            break;
        case 's':
        default:
            $sqlcmd .= "SELECT * FROM ".$table;
            if ($this->parameters[0]!='null')
            {
                $sqlcmd .= " WHERE studentID=". $this->parameters[0];
            }
    }
}

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        }
        $sqlcmd .= ";";
        break;
    }
    echo "SQL Command: ".$sqlcmd."<br>\n<br>\n";

    $result = $this->dbh->query($sqlcmd);

    // output results
    echo "<table border=1>\n<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>\n";
    while ($row = $result->fetch(PDO::FETCH_ASSOC))
    {
        echo "<tr><td>".$row['studentID']. "</td><td>".$row['studentName']. "</td><td>".$row['major']. "</td><td>".$row['note']. "</td><td>".$row['updateDate']. "</td></tr>\n";
    }
    echo "</table><br>\n";
}

public function __destruct()
{
    // close database connection
    if ($this->dbh!=null)
    {
        $this->dbh = null;
        echo "mysql connection closed<br>\n<br>\n";
    }
}

}
?>
```

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junchao@junchao-IoTUbuntu1804:~$ # delete an existing file on server via HTTP DELETE request
junchao@junchao-IoTUbuntu1804:~$ curl -X DELETE http://18.222.58.97/IoT/hw5/toDelete.txt
junchao@junchao-IoTUbuntu1804:~$ # delete a non-exist file on server (404 error)
junchao@junchao-IoTUbuntu1804:~$ curl -X DELETE http://18.222.58.97/IoT/hw5/toDelete.txt
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>404 Not Found</title>
</head><body>
<h1>Not Found</h1>
<p>The requested URL /IoT/hw5/toDelete.txt was not found on this server.</p>
<hr>
<address>Apache/2.4.29 (Ubuntu) Server at 18.222.58.97 Port 80</address>
</body></html>
junchao@junchao-IoTUbuntu1804:~$ # delete a non-writable file on server (Works! Be careful!)
junchao@junchao-IoTUbuntu1804:~$ curl -X DELETE http://18.222.58.97/IoT/hw5/hw5.php_back
junchao@junchao-IoTUbuntu1804:~$ # operate database using descriptions stored in a non-exist file via GET implicitly (error:
File doesn't exist!)
junchao@junchao-IoTUbuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php?file=hgfhgfd1596165
HTTP method: GET<br>
<br>
File <b>hgfhgfd1596165</b> doesn't exist!<br>
junchao@junchao-IoTUbuntu1804:~$ # operate database using descriptions stored in a non-exist file via POST implicitly (error:
File doesn't exist!)
junchao@junchao-IoTUbuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php -d 'file=jdbgfgy156afdsg48.txt'
HTTP method: POST<br>
<br>
File <b>jdbgfgy156afdsg48.txt</b> doesn't exist!<br>
junchao@junchao-IoTUbuntu1804:~$ # create a file 1 describing details of a row to be inserted into database via HTTP PUT
request
junchao@junchao-IoTUbuntu1804:~$ curl -X PUT http://18.222.58.97/IoT/hw5/1 -d "name=Junchao Mei&major=CS&note=standardized
input&operation=i"
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>201 Created</title>
</head><body>
<h1>Created</h1>
<p>Resource /IoT/hw5/1 has been created.</p>
<hr />
<address>Apache/2.4.29 (Ubuntu) Server at 18.222.58.97 Port 80</address>
</body></html>
junchao@junchao-IoTUbuntu1804:~$ # operate database using file 1 via GET explicitly
junchao@junchao-IoTUbuntu1804:~$ curl -X GET http://18.222.58.97/IoT/hw5/hw5.php?file=1
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: INSERT INTO students (studentName, major, note, updateDate) VALUES ('Junchao Mei','CS','standardized
input','2019-07-23 04:04:00');<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # display all rows in database
junchao@junchao-IoTUbuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: SELECT * FROM students;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
<tr><td>1</td><td>Junchao Mei</td><td>CS</td><td>standardized input</td><td>2019-07-23 04:04:00</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # create a file 123.txt describing details of a row to be inserted into database via HTTP PUT
request
junchao@junchao-IoTUbuntu1804:~$ curl -X PUT http://18.222.58.97/IoT/hw5/123.txt -d "id=123&name=Amy Smith&note=non-
consecutive id, no major, file name with extension&abc=qazxse6&operation=i"
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>201 Created</title>
</head><body>
<h1>Created</h1>
<p>Resource /IoT/hw5/123.txt has been created.</p>

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<hr />
<address>Apache/2.4.29 (Ubuntu) Server at 18.222.58.97 Port 80</address>
</body></html>
junchao@junchao-IoTUbuntu1804:~$ # operate database using file 123.txt via POST explicitly
junchao@junchao-IoTUbuntu1804:~$ curl -X POST http://18.222.58.97/IoT/hw5/hw5.php -d "file=123.txt&name=John
Carbone&note=different from file&gpa=3.88"
HTTP method: POST<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: INSERT INTO students (studentName, major, note, updateDate) VALUES ('Amy Smith',null,'non-consecutive id, no
major, file name with extension','2019-07-23 04:04:00');<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # display a row doesn't exist in database
junchao@junchao-IoTUbuntu1804:~$ curl -X GET http://18.222.58.97/IoT/hw5/hw5.php?id=123
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: SELECT * FROM students WHERE studentID=123;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # display all rows in database
junchao@junchao-IoTUbuntu1804:~$ curl -X GET http://18.222.58.97/IoT/hw5/hw5.php
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: SELECT * FROM students;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
<tr><td>1</td><td>Junchao Mei</td><td>CS</td><td>standardized input</td><td>2019-07-23 04:04:00</td></tr>
<tr><td>2</td><td>Amy Smith</td><td></td><td>non-consecutive id, no major, file name with extension</td><td>2019-07-23
04:04:00</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # display the newest row in database
junchao@junchao-IoTUbuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php?id=2
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: SELECT * FROM students WHERE studentID=2;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
<tr><td>2</td><td>Amy Smith</td><td></td><td>non-consecutive id, no major, file name with extension</td><td>2019-07-23
04:04:00</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # read file via GET
junchao@junchao-IoTUbuntu1804:~$ curl -X GET http://18.222.58.97/IoT/hw5/123.txt
id=123&name=Amy Smith&note=non-consecutive id, no major, file name with extension&abc=qazxse6&operation=ijunchao@junchao-
IoTUbuntu1804:~$ # read a non-exist file via GET (404 error)
junchao@junchao-IoTUbuntu1804:~$ curl -X GET http://18.222.58.97/IoT/hw5/dsafjlg
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>404 Not Found</title>
</head><body>
<h1>Not Found</h1>
<p>The requested URL /IoT/hw5/dsafjlg was not found on this server.</p>
<hr>
<address>Apache/2.4.29 (Ubuntu) Server at 18.222.58.97 Port 80</address>
</body></html>
junchao@junchao-IoTUbuntu1804:~$ # try (but fail) to update file via POST
junchao@junchao-IoTUbuntu1804:~$ curl -X POST http://18.222.58.97/IoT/hw5/123.txt -d "id=2&name=Amy

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Smith&major=law&fruit=apple&note=cannot update file via POST"
id=123&name=Amy Smith&note=non-consecutive id, no major, file name with extension&abc=qazxse6&operation=ijunchao@junchao-
IoTubuntu1804:~$ # read file via POST
junchao@junchao-IoTubuntu1804:~$ curl -X POST http://18.222.58.97/IoT/hw5/123.txt
id=123&name=Amy Smith&note=non-consecutive id, no major, file name with extension&abc=qazxse6&operation=ijunchao@junchao-
IoTubuntu1804:~$ # read a non-exist file via POST (404 error)
junchao@junchao-IoTubuntu1804:~$ curl -X POST http://18.222.58.97/IoT/hw5/dsafjlg
<!DOCTYPE HTML PUBLIC "-//IETF/DTD HTML 2.0//EN">
<html><head>
<title>404 Not Found</title>
</head><body>
<h1>Not Found</h1>
<p>The requested URL /IoT/hw5/dsafjlg was not found on this server.</p>
<hr>
<address>Apache/2.4.29 (Ubuntu) Server at 18.222.58.97 Port 80</address>
</body></html>
junchao@junchao-IoTubuntu1804:~$ # insert a row to database directly via GET explicitly
junchao@junchao-IoTubuntu1804:~$ curl -X GET "http://18.222.58.97/IoT/hw5/hw5.php?
name=&note=emptyName+noMajor+extraGPA&gpa=3.98&operation=i"
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: INSERT INTO students (studentName, major, note, updateDate) VALUES ('',null,'emptyName noMajor
extraGPA','2019-07-23 04:04:02');<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTubuntu1804:~$ # insert a row to database directly via POST explicitly
junchao@junchao-IoTubuntu1804:~$ curl -X POST http://18.222.58.97/IoT/hw5/hw5.php -d "id=843&name=Aaron
Segura&major=math&operation=i"
HTTP method: POST<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: INSERT INTO students (studentName, major, note, updateDate) VALUES ('Aaron Segura','math',null,'2019-07-23
04:04:02');<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTubuntu1804:~$ # display all rows in database via POST
junchao@junchao-IoTubuntu1804:~$ curl -X POST http://18.222.58.97/IoT/hw5/hw5.php
HTTP method: POST<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: SELECT * FROM students;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
<tr><td>1</td><td>Junchao Mei</td><td>CS</td><td>standardized input</td><td>2019-07-23 04:04:00</td></tr>
<tr><td>2</td><td>Amy Smith</td><td></td><td>non-consecutive id, no major, file name with extension</td><td>2019-07-23
04:04:00</td></tr>
<tr><td>3</td><td></td><td></td><td>emptyName noMajor extraGPA</td><td>2019-07-23 04:04:02</td></tr>
<tr><td>4</td><td>Aaron Segura</td><td>math</td><td></td><td>2019-07-23 04:04:02</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTubuntu1804:~$ # update a row in database via GET
junchao@junchao-IoTubuntu1804:~$ curl -X GET "http://18.222.58.97/IoT/hw5/hw5.php?
id=3&name=Morgan+Grossmann&note=update+via+GET&operation=u"
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: UPDATE students SET studentName='Morgan Grossmann',major=null,note='update via GET',updateDate='2019-07-23
04:04:02' WHERE studentID=3;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>

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<br>
junchao@junchao-IoTUbuntu1804:~$ # display the updated row via GET
junchao@junchao-IoTUbuntu1804:~$ curl -X GET http://18.222.58.97/IoT/hw5/hw5.php?id=3
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: SELECT * FROM students WHERE studentID=3;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
<tr><td>3</td><td>Morgan Grossmann</td><td></td><td>update via GET</td><td>2019-07-23 04:04:02</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # update a non-exist row in database via GET
junchao@junchao-IoTUbuntu1804:~$ curl -X GET "http://18.222.58.97/IoT/hw5/hw5.php?id=5&note=update+non-exist+row&operation=u"
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: UPDATE students SET studentName=null,major=null,note='update non-exist row',updateDate='2019-07-23 04:04:06'
WHERE studentID=5;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # update a row in database via POST
junchao@junchao-IoTUbuntu1804:~$ curl -X POST http://18.222.58.97/IoT/hw5/hw5.php -d
"id=4&major=applied+mathematics&note=update+via+POST&operation=u"
HTTP method: POST<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: UPDATE students SET studentName=null,major='applied mathematics',note='update via POST',updateDate='2019-07-23
04:06:58' WHERE studentID=4;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # display the updated row via POST
junchao@junchao-IoTUbuntu1804:~$ curl -X POST http://18.222.58.97/IoT/hw5/hw5.php -d "id=4"
HTTP method: POST<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: SELECT * FROM students WHERE studentID=4;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
<tr><td>4</td><td></td><td>applied mathematics</td><td>update via POST</td><td>2019-07-23 04:06:58</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # update a non-exist row in database via POST
junchao@junchao-IoTUbuntu1804:~$ curl -X POST http://18.222.58.97/IoT/hw5/hw5.php -d "id=6&note=update+non-
exist+row&operation=u"
HTTP method: POST<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: UPDATE students SET studentName=null,major=null,note='update non-exist row',updateDate='2019-07-23 04:06:59'
WHERE studentID=6;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # update file 123.txt via PUT
junchao@junchao-IoTUbuntu1804:~$ curl -X PUT http://18.222.58.97/IoT/hw5/123.txt -d "id=2&name=Amy
Smith&major=law&note=updated by PUT file&operation=u"
junchao@junchao-IoTUbuntu1804:~$ # update a row in database using updated 123.txt via GET implicitly
junchao@junchao-IoTUbuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php?file=123.txt
```

```

HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: UPDATE students SET studentName='Amy Smith',major='law',note='updated by PUT file',updateDate='2019-07-23
04:06:59' WHERE studentID=2;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # display the updated row via GET implicitly
junchao@junchao-IoTUbuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php?id=2
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: SELECT * FROM students WHERE studentID=2;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
<tr><td>2</td><td>Amy Smith</td><td>law</td><td>updated by PUT file</td><td>2019-07-23 04:06:59</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # create a file 6 via PUT to update a non-exist row in database
junchao@junchao-IoTUbuntu1804:~$ curl -X PUT http://18.222.58.97/IoT/hw5/6 -d "id=6&name=Kara Zor El&major=heat
vision&note=non exist row&operation=u"
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>201 Created</title>
</head><body>
<h1>Created</h1>
<p>Resource /IoT/hw5/6 has been created.</p>
<hr />
<address>Apache/2.4.29 (Ubuntu) Server at 18.222.58.97 Port 80</address>
</body></html>
junchao@junchao-IoTUbuntu1804:~$ # update a non-exist row in database via POST using file 6
junchao@junchao-IoTUbuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php -d "file=6"
HTTP method: POST<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: UPDATE students SET studentName='Kara Zor El',major='heat vision',note='non exist row',updateDate='2019-07-23
04:07:00' WHERE studentID=6;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # create a file display via PUT to display all rows in database
junchao@junchao-IoTUbuntu1804:~$ curl -X PUT http://18.222.58.97/IoT/hw5/display -d "operation=s"
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>201 Created</title>
</head><body>
<h1>Created</h1>
<p>Resource /IoT/hw5/display has been created.</p>
<hr />
<address>Apache/2.4.29 (Ubuntu) Server at 18.222.58.97 Port 80</address>
</body></html>
junchao@junchao-IoTUbuntu1804:~$ # display all rows in database via GET using file display
junchao@junchao-IoTUbuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php?file=display
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: SELECT * FROM students;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
<tr><td>1</td><td>Junchao Mei</td><td>CS</td><td>standardized input</td><td>2019-07-23 04:04:00</td></tr>
<tr><td>2</td><td>Amy Smith</td><td>law</td><td>updated by PUT file</td><td>2019-07-23 04:06:59</td></tr>
<tr><td>3</td><td>Morgan Grossmann</td><td></td><td>update via GET</td><td>2019-07-23 04:04:02</td></tr>
<tr><td>4</td><td></td><td></td><td>applied mathematics</td><td>update via POST</td><td>2019-07-23 04:06:58</td></tr>
</table><br>

```

```

mysql connection closed<br>
<br>
junchao@junchao-IoTubuntu1804:~$ # delete a row in database via GET
junchao@junchao-IoTubuntu1804:~$ curl -X GET "http://18.222.58.97/IoT/hw5/hw5.php?operation=d&id=1&gpa=8.79"
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: DELETE FROM students WHERE studentID=1;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTubuntu1804:~$ # delete a non-exist row in database via GET
junchao@junchao-IoTubuntu1804:~$ curl -X GET "http://18.222.58.97/IoT/hw5/hw5.php?operation=d&id=8"
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: DELETE FROM students WHERE studentID=8;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTubuntu1804:~$ # display all rows in database
junchao@junchao-IoTubuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: SELECT * FROM students;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
<tr><td>2</td><td>Amy Smith</td><td>law</td><td>updated by PUT file</td><td>2019-07-23 04:06:59</td></tr>
<tr><td>3</td><td>Morgan Grossmann</td><td></td><td>update via GET</td><td>2019-07-23 04:04:02</td></tr>
<tr><td>4</td><td></td><td>applied mathematics</td><td>update via POST</td><td>2019-07-23 04:06:58</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTubuntu1804:~$ # delete a row in database via POST
junchao@junchao-IoTubuntu1804:~$ curl -X POST http://18.222.58.97/IoT/hw5/hw5.php -d "id=2&operation=d"
HTTP method: POST<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: DELETE FROM students WHERE studentID=2;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTubuntu1804:~$ # delete a non-exist row in database via POST
junchao@junchao-IoTubuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php -d "id=7&operation=d&OS=Win10"
HTTP method: POST<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: DELETE FROM students WHERE studentID=7;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTubuntu1804:~$ # display all rows in database
junchao@junchao-IoTubuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: SELECT * FROM students;<br>
<br>

```

```

<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
<tr><td>3</td><td>Morgan Grossmann</td><td></td><td></td><td>update via GET</td><td>2019-07-23 04:04:02</td></tr>
<tr><td>4</td><td></td><td></td><td></td><td>applied mathematics</td><td>update via POST</td><td>2019-07-23 04:06:58</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # create a file delete3 via PUT to delete row id=3
junchao@junchao-IoTUbuntu1804:~$ curl -X PUT http://18.222.58.97/IoT/hw5/delete3 -d "operation=d&id=3"
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>201 Created</title>
</head><body>
<h1>Created</h1>
<p>Resource /IoT/hw5/delete3 has been created.</p>
<hr />
<address>Apache/2.4.29 (Ubuntu) Server at 18.222.58.97 Port 80</address>
</body></html>
junchao@junchao-IoTUbuntu1804:~$ # delete a row in database via POST using file delete3
junchao@junchao-IoTUbuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php -d "file=delete3"
HTTP method: POST<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: DELETE FROM students WHERE studentID=3;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # update file delete3 via PUT to tentatively delete row id=10
junchao@junchao-IoTUbuntu1804:~$ curl -X PUT http://18.222.58.97/IoT/hw5/delete3 -d "operation=d&id=10"
junchao@junchao-IoTUbuntu1804:~$ # delete a non-exist row in database via GET using file delete3
junchao@junchao-IoTUbuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php?file=delete3
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: DELETE FROM students WHERE studentID=10;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$ # display all rows in database
junchao@junchao-IoTUbuntu1804:~$ curl http://18.222.58.97/IoT/hw5/hw5.php
HTTP method: GET<br>
<br>
mysql connect successfully<br>
<br>
SQL Command: SELECT * FROM students;<br>
<br>
<table border=1>
<tr><td>studentID</td><td>studentName</td><td>major</td><td>note</td><td>updateDate</td></tr>
<tr><td>4</td><td></td><td></td><td></td><td>applied mathematics</td><td>update via POST</td><td>2019-07-23 04:06:58</td></tr>
</table><br>
mysql connection closed<br>
<br>
junchao@junchao-IoTUbuntu1804:~$

```