

TDD -Consumer Driven Contract Testing UE 4

<https://github.com/if24b210/TDD-UE4-ConsumerProvider>

UE4 - Consumer Driven Contract Testing

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FH Technikum Wien

Neda Stefanovic, if24b210@technikum-wien

Aufgabe:

Consumer Driven Contract Testing

Use an existing project dealing with REST-Services (one of your projects or choose a Github repository of an application you like).

Make an own git repo with all the source files.

Install and configure pact.io, so that you can access the contract server. Define contracts for the services in your code. Commit the code

and the contracts. Then seed 3 “bugs” in the consumer code or the provider code (if your code does not include consumer calls, write

an artificial consumer). Run the consumer and the provider tests and check, if the seeded bugs are found. Capture the logs and

screenshot of the tests run. Upload a zip containing the logs, screenshots and the git repository to Moodle.

Im Rahmen dieser Übung wurde als Referenzprojekt das laufende IT-Projekt *GreenSpace* gewählt, das im internationalen Kontext mit Studierenden aus Thailand (King Mongkut’s Institute of Technology North Bangkok) im Bereich Test Driven Development (TDD) entwickelt wurde.

Team Lead: Neda Stefanovic

GitHub:

<https://github.com/if24b210/GreenSpace>

Test Driven Development, GitHub – Abgabe UE04:

<https://github.com/if24b210/TDD-UE4-ConsumerProvider>

README.md Installationsanleitung: README.md

Clone

```
PS D:\DEV> git clone https://github.com/if24b210/GreenSpace.git TDD-UE04-V2
Cloning into 'TDD-UE04-V2'...
remote: Enumerating objects: 3393, done.
remote: Counting objects: 100% (133/133), done.
remote: Compressing objects: 100% (65/65), done.
remote: Total 3393 (delta 93), reused 68 (delta 68), pack-reused 3260 (from 5)
Receiving objects: 100% (3393/3393), 47.10 MiB | 3.33 MiB/s, done.
Resolving deltas: 100% (1069/1069), done.
Updating files: 100% (2212/2212), done.
PS D:\DEV> █
```

Zeige die Gesamtgröße

```
"{0:N2} MB" -f ((Get-ChildItem -Recurse | Measure-Object -Property Length -Sum).Sum / 1MB)
```

```
PS D:\DEV> cd TDD-UE04-V2
PS D:\DEV\TDD-UE04-V2> "{0:N2} MB" -f ((Get-ChildItem -Recurse | Measure-Object -Property Length -Sum).Sum / 1MB)
75,77 MB
```

die komplette Ordnerstruktur

```
tree /f > projektstruktur.txt
```

```
notepad projektstruktur.txt
```

```
PS D:\DEV> cd TDD-UE04-V2
PS D:\DEV\TDD-UE04-V2> "{0:N2} MB" -f ((Get-ChildItem -Recurse .).Length / 1MB)
75,77 MB
PS D:\DEV\TDD-UE04-V2> tree /f > projektstruktur.txt
PS D:\DEV\TDD-UE04-V2> notepad projektstruktur.txt
PS D:\DEV\TDD-UE04-V2> 
```

projektstruktur.txt - Notepad

File Edit Format View Help

- js
 - add-park-to-local-storage.js
 - init_map.js
 - load-filters.js
 - load-footer.js
 - load-navbar.js
 - load_cemeteries.js
 - load_parks.js
 - load_playgrounds.js
 - map.js
 - map_helper.js
 - packingList.js
 - park_details.js
 - printButton.js
 - render_playgrounds.js
 - routing.js
 - safe_park_to_local_storage.js
 - script.js
 - search_parks.js
 - show_user_location.js
 - summary.js
 - weather-forecast.js
 - weather.js
- data
 - FRIEDHOFOGD.json
 - green_space_metadata_vienna.json
 - HUNDEZONEOGD.json
 - PARKINFOOGD.json
 - SPIELPLATZPUNKTOGD.json
 - WALDSPIELPLOGD.json
 - WCANLAGE2OGD.json
 - weather_icons.json

Kein origin, ab jetzt nun alles lokal

```
● PS D:\DEV\TDD-UE04-V2> git remote remove origin
● PS D:\DEV\TDD-UE04-V2> git remote -v
○ PS D:\DEV\TDD-UE04-V2> 
```

Alte .git (ge-cloned) Ordner löschen & kontrollieren:

Remove-Item -Recurse -Force .git

git status -> Git würde entfernt

```
● PS D:\DEV\TDD-UE04-V2> Remove-Item -Recurse -Force .git
⊗ PS D:\DEV\TDD-UE04-V2> git status
fatal: not a git repository (or any of the parent directories): .git
❖ PS D:\DEV\TDD-UE04-V2> 
```

Bereinigen:

Gesamtgröße pro Hauptordner

```
Get-ChildItem -Directory | ForEach-Object {  
    $size = (Get-ChildItem $_.FullName -Recurse -File | Measure-Object Length -Sum).Sum  
    [PSCustomObject]@{  
        Ordner = $_.Name  
        Größe_MB = [math]::Round($size / 1MB, 2)  
    }  
} | Sort-Object Größe_MB -Descending
```

```
PS D:\DEV\TDD-UE04-V2> Get-ChildItem -Directory | ForEach-Object {  
>>     $size = (Get-ChildItem $_.FullName -Recurse -File | Measure-Object Length -Sum).Sum  
>>     [PSCustomObject]@{  
>>         Ordner = $_.Name  
>>         Größe_MB = [math]::Round($size / 1MB, 2)  
>>     }  
>> } | Sort-Object Größe_MB -Descending  
e6-4861-bad6-e47726a75e00
```

Ordner	Größe_MB
Documentation	59,68
assets	12,88
data	2,16
screenshots	0,91
templates	0,06
includes	0,01

Nach der Bereinigung = > 5,82 MB

"{0:N2} MB" -f ((Get-ChildItem -Recurse -File | Measure-Object Length -Sum).Sum / 1MB)

Bootstrap Ordner entfernt(index, und andere seite werden angepasst)

```
PS D:\DEV\TDD-UE04-V2\assets> cd..  
PS D:\DEV\TDD-UE04-V2> Get-ChildItem -Directory | ForEach-Object {  
>>     $size = (Get-ChildItem $_.FullName -Recurse -File | Measure-Object Length -Sum).Sum  
>>     [PSCustomObject]@{  
>>         Ordner = $_.Name  
>>         Größe_MB = [math]::Round($size / 1MB, 2)  
>>     }  
>> } | Sort-Object Größe_MB -Descending
```

Ordner	Größe_MB
data	2,16
assets	1,75
screenshots	0,91
Documentation	0,7
templates	0,06
includes	0,01

```
PS D:\DEV\TDD-UE04-V2> "{0:N2} MB" -f ((Get-ChildItem -Recurse -File | Measure-Object Length -Sum).Sum / 1MB)  
5,82 MB  
PS D:\DEV\TDD-UE04-V2>
```

Git lokal initialisieren

```
PS D:\DEV\TDD-UE04-V2> git init  
Initialized empty Git repository in D:/DEV/TDD-UE04-V2/.git/  
PS D:\DEV\TDD-UE04-V2>
```

Stylesheet angepasst in header, da bootstrap gelöscht ist

.gitignore

```
◆ .gitignore
1  # Node.js Abhängigkeiten
2  node_modules/
3  npm-debug.log*
4  package-lock.json
5
6  # Build-Verzeichnisse
7  dist/
8  # Umgebungsvariablen
9  .env
10 # Betriebssystem-spezifische Dateien
11 .DS_Store
12 # Editor-spezifische Dateien
13 .vscode/
14 # Temporäre Dateien
15 tmp/
```

git add .

git status

```
● PS D:\DEV\TDD-UE04-V2> git add .
● PS D:\DEV\TDD-UE04-V2> git status
On branch main

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
    new file:   .gitignore
    new file:   Documentation/GreenSpace-Doku-ITP-gruppe05.pdf
    new file:   LICENSE
    new file:   README.md
```

git commit -m "Initial commit with .gitignore and project structure"

git log --oneline

```
PS D:\DEV\TDD-UE04-V2> git log --oneline
● 2ce82a5 (HEAD -> main) Initial commit with .gitignore and project structure
○ PS D:\DEV\TDD-UE04-V2> 
```

----- Git ist jetzt bereinigt und einsatzbereit für eigentliche UE04 -----

Package json mit Consumer installieren

Pact-Installation – Vorbereitung

Node.js-Projekt vorbereiten (npm init) , erzeugt standard package.json

npm init -y

```
PS D:\DEV\TDD-UE04-V2> npm init -y
Wrote to D:\DEV\TDD-UE04-V2\package.json:

{
  "name": "tdd-ue04-v2",
  "version": "1.0.0",
  "description": "GreenScape is a **Trip Planner** designed for public green areas in **Vienna**. \r The application helps users find parks and playgrounds – tailored to their personal needs.",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "keywords": [],
  "author": "",
  "license": "ISC"
}
```

Pact – Consumer installieren

npm install @pact-foundation/pact --save-dev

entsteht ein ordner: node_modules

package.json, update: devDependencies



```
{
  "name": "tdd-ue04-v2",
  "version": "1.0.0",
  "description": "GreenScape is a **Trip Planner** designed for public green areas in **Vienna**. \r The application helps users find parks and playgrounds – tailored to their personal needs.",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "keywords": [],
  "author": "",
  "license": "ISC",
  "devDependencies": {
    "@pact-foundation/pact": "^15.0.1"
  }
}
```

Commit: package.json mit Pact-Abhängigkeit

git add package.json package-lock.json

git commit -m "Add Pact as dev dependency"

```
PS D:\DEV\TDD-UE04-V2> git add package.json package-lock.json
warning: in the working copy of 'package-lock.json', LF will be replace
d by CRLF the next time Git touches it
PS D:\DEV\TDD-UE04-V2> git commit -m "Add Pact as dev dependency"
[main a598d13] Add Pact as dev dependency
2 files changed, 1831 insertions(+)
create mode 100644 package-lock.json
create mode 100644 package.json
PS D:\DEV\TDD-UE04-V2> git log --oneline
a598d13 (HEAD -> main) Add Pact as dev dependency
2ce82a5 Initial commit with .gitignore and project structure
```

Consumer

Testdatei für den Contract

neue Datei: getPlaygrounds.pact.test.js

```
PS D:\DEV\TDD-UE04-V2> git add consumer/getPlaygrounds.pact.test.js
PS D:\DEV\TDD-UE04-V2> git commit -m "Add empty consumer Pact test for getPlaygrounds"
[main baf0f53] Add empty consumer Pact test for getPlaygrounds
1 file changed, 0 insertions(+), 0 deletions(-)
create mode 100644 consumer/getPlaygrounds.pact.test.js
PS D:\DEV\TDD-UE04-V2> git log --oneline
baf0f53 (HEAD -> main) Add empty consumer Pact test for getPlaygrounds
63cf3f1 remove package-lock.json from .gitignore
a598d13 Add Pact as dev dependency
2ce82a5 Initial commit with .gitignore and project structure
```

consumer/provider-Namen, API-Expectations und Matchers:

- consumer: "PlaygroundConsumer",
- provider: "PlaygroundProvider",

git add consumer/getPlaygrounds.pact.test.js

git commit -m "Add realistische Pact-Teststruktur für /spielplaetze"

```
PS D:\DEV\TDD-UE04-V2> git log --oneline
75cc34b (HEAD -> main) Add realistische Pact-Teststruktur für /spielplaetze
baf0f53 Add empty consumer Pact test for getPlaygrounds
63cf3f1 remove package-lock.json from .gitignore
a598d13 Add Pact as dev dependency
2ce82a5 Initial commit with .gitignore and project structure
```


Consumer schreiben + Testen

Testlauf starten – Consumer

node consumer/getPlaygrounds.pact.test.js

Eine http-Anfrage an Mock server wird gesendet.

verify() prüft: Hat der Client genau so angefragt wie definiert?

finalize() speichert den Vertrag

Pact „simuliert“ den Provider /spielplaetze

Der Consumer weiß, was er vom Provider erwartet.

Ein Vertrag (Pact) wird erstellt und später vom Provider getestet.

git add consumer/getPlaygrounds.pact.test.js

git commit -m "Add Pact consumer test with realistic playground structure"

git status

git log --oneline

```
// Pact Consumer Test für den PlaygroundService

// Pact-Bibliothek importieren
const path = require("path");
const { Pact, Matchers } = require("@pact-foundation/pact"); // Pact-Bibliothek importieren
const axios = require("axios"); // stellt anfrage an HTTP-Server

const { eachLike, like } = Matchers; // Mathers: beschreibt das erwartete Datenformat in der

// Pack-Mock-Provider konfiguration
const provider = new Pact({
  consumer: "PlaygroundConsumer",
  provider: "PlaygroundProvider",
  port: 1234,
  log: path.resolve(process.cwd(), "logs", "pact.log"), // Pfad für das Pact-Logfile
  dir: path.resolve(process.cwd(), "pacts"), // der Vertrag wird hier gespeichert
  logLevel: "INFO"
});
```

```

PS D:\DEV\TDD-UE04-V2> node consumer/getPlaygrounds.pact.test.js
● [04:00:58.558] INFO (2292): 0.4.22: pact native library successfully found, and the correct version
2025-06-21T02:00:58.694776Z INFO tokio-runtime-worker pact_mock_server::hyper_server:
Received request GET /spielplaetze
2025-06-21T02:00:58.695432Z INFO tokio-runtime-worker pact_mock_server::hyper_server:
Request matched, sending response
Status: 200
Erste Antwort: {
  "geometry": {
    "coordinates": [
      16.36248055,
      48.18779685
    ],
    "type": "Point"
  },
  "id": "SPIELPLATZPUNKTOGD.2225591",
  "ANL_NAME": "Rudolf-Sallinger-Park",
  "BEZIRK": 5,
  "SE_ANNO_CAD_DATA": null,
  "SPIELPLATZ_DETAIL": "Fußball, Klettern, Rutschen, ...",
  "TYP_DETAIL": "Ballspielkäfig, Spielplatz"
},
  "type": "Feature"
}
s an older specification version (V2), and will be upgraded
Pact-Test erfolgreich abgeschlossen!
PS D:\DEV\TDD-UE04-V2> git add consumer/getPlaygrounds.pact.test.js
PS D:\DEV\TDD-UE04-V2> git commit -m "Add Pact consumer test with realistic playground structure"
[main b023856] Add Pact consumer test with realistic playground structure
● 1 file changed, 52 insertions(+), 56 deletions(-)

```

Provider-Teil – mit Bugs

provider/server.js – server OK

```
provider > JS server.js > ...
1  const express = require("express");
2  const app = express();
3  const port = 1235;
4
5  const playgrounds = [
6    {
7      type: "Feature",
8      id: "SPIELPLATZPUNKTOGD.2225591",
9      geometry: {
10        type: "Point",
11        coordinates: [16.36248055, 48.18779685],
12      },
13      geometry_name: "SHAPE",
14      properties: {
15        OBJECTID: 2225591,
16        ANL_NAME: "Rudolf-Sallinger-Park",
17        BEZIRK: 5,
18        SPIELPLATZ_DETAIL: "Fußball, Klettern, Rutschen, ...",
19        TYP_DETAIL: "Ballspielkäfig, Spielplatz",
20        SE_ANNO_CAD_DATA: null,
21      },
22    },
23  ];
24
25  app.get("/spielplaetze", (req, res) => {
26    res.json(playgrounds);
27  });
28
29  app.listen(port, () => {
30    console.log(`Provider läuft auf http://localhost:${port}`);
31  });
32
```

PROBLEMS OUTPUT TERMINAL PORTS DEBUG CONSOLE

PS D:\DEV\TDD-UE04-V2> node provider/server.js
Provider läuft auf http://localhost:1235
□

+ v ... ^ x

powershell
powershell
powershell

Pact für Provider installieren

```
npm install --save-dev @pact-foundation/pact
```

Provider-Test-Datei

```
validatePlaygrounds.pact.test.js
```

Test ausführen - OK

1. node provider/server.js
2. node provider/validatePlaygrounds.pact.test.js

```
Verifying a pact between PlaygroundConsumer and PlaygroundProvider

eine Anfrage für alle Spielplätze (0s loading, 166ms verification)
  Given Spielplatzdaten sind vorhanden
    returns a response which
      has status code 200 (OK)
      includes headers
        "Content-Type" with value "application/json; charset=utf-8" (OK)
      has a matching body (OK)

[04:29:51.690] INFO (2180): pact-core@16.0.0: Verification successful
Pact-Verifizierung erfolgreich!
finished: 0
PS D:\DEV\TDD-UE04-V2>
```

- Server liefert die erwarteten Spielplatzdaten im Pact-Format, und
- das Contract File, PlaygroundConsumer-PlaygroundProvider.json ist validiert, gegen echten Provider

```
git add provider/server.js provider/validatePlaygrounds.pact.test.js
```

```
git commit -m "Add Pact provider verification for playgrounds"
```

```
PS D:\DEV\TDD-UE04-V2> git log --oneline
c94f30c (HEAD -> main) Add Pact provider verification for playgrounds
b023856 Add Pact consumer test with realistic playground structure
75cc34b Add realistische Pact-Teststruktur für /spielplaetze
baf0f53 Add empty consumer Pact test for getPlaygrounds
63cf3f1 remove package-lock.json from .gitignore
a598d13 Add Pact as dev dependency
2ce82a5 Initial commit with .gitignore and project structure
```

Drei Fehler (Bugs) einbauen – lt. Aufgabe

Beispiel-Bug #1

- a. das Feld „BEZIRK“ fehlt komplett im Response
im server.js: // auskommentieren

```
provider > JS server.js > app.get("/spielplaetze") callback > properties
1  const express = require("express");
2  const app = express();
3  const PORT = 1235; // exakt dieser Port!
4
5  app.get("/spielplaetze", (req, res) => {
6    res.json([
7      {
8        type: "Feature",
9        id: "SPIELPLATZPUNKTOGD.2225591",
10       geometry: {
11         type: "Point",
12         coordinates: [16.36248055, 48.18779685],
13       },
14       geometry_name: "SHAPE",
15       properties: {
16         OBJECTID: 2225591,
17         ANL_NAME: "Rudolf-Sallinger-Park",
18         //BEZIRK: 5,
19         SPIELPLATZ_DETAIL: "Fußball, Klettern, Rutschen, ...",
20         TYP_DETAIL: "Ballspielkäfig, Spielplatz",
21         SE_ANNO_CAD_DATA: null,
22       },
23     },
24   ]);
25 });
26
27 app.listen(PORT, () => {
28   console.log(`PlaygroundProvider läuft auf http://localhost:${PORT}`);
29 });
```

- b. server starten: node provider/server.js
c. in neuem Terminal:
node provider/validatePlaygrounds.pact.test.js

```
Verifying a pact between PlaygroundConsumer and PlaygroundProvider

eine Anfrage für alle Spielplätze (0s loading, 80ms verification)
Given Spielplatzdaten sind vorhanden
returns a response which
has status code 200 (OK)
includes headers
  "Content-Type" with value "application/json; charset=utf-8" (OK)
has a matching body (FAILED)

Failures:

1) Verifying a pact between PlaygroundConsumer and PlaygroundProvider Given Spielplatzd*
   aten sind vorhanden - eine Anfrage für alle Spielplätze
   1.1) has a matching body
      ${0}.properties -> Actual map is missing the following keys: BEZIRK

There were 1 pact failures
```

- d. git add provider/server.js
e. git commit -m "Bug 1: BEZIRK missing in Response"

```
PS D:\DEV\TDD-UE04-V2> git add provider/server.js
PS D:\DEV\TDD-UE04-V2> git commit -m "Bug 1: BEZIRK missing in Response"
[main 50c81c5] Bug 1: BEZIRK missing in Response
1 file changed, 2 insertions(+), 1 deletion(-)
PS D:\DEV\TDD-UE04-V2> git log --oneline
50c81c5 (HEAD -> main) Bug 1: BEZIRK missing in Response
c94f30c Add Pact provider verification for playgrounds
b023856 Add Pact consumer test with realistic playground structure
75cc34b Add realistische Pact-Teststruktur für /spielplaetze
baf0f53 Add empty consumer Pact test for getPlaygrounds
63cf3f1 remove package-lock.json from .gitignore
a598d13 Add Pact as dev dependency
2ce82a5 Initial commit with .gitignore and project structure
```

Beispiel-Bug #2

- a) Falscher Datentyp bei OBJECTID (string statt number)

```
properties: {  
  // Bug #2  
  OBJECTID: "2225591",  
  ANL_NAME: "Rudolf-Sallinger-Park",  
  BEZIRK: 5,  
  // Bug #1  
  //BEZIRK: 5,  
  SPIELPLATZ_DETAIL: "Fußball, Klettern, Rutschen, ...",  
  TYP_DETAIL: "Ballspielkäfig, Spielplatz",  
  SE_ANNO_CAD_DATA: null,  
},
```

- b) server starten: node provider/server.js

- c) in neuem Terminal: node provider/validatePlaygrounds.pact.test.js

```
Verifying a pact between PlaygroundConsumer and PlaygroundProvider  
  
eine Anfrage für alle Spielplätze (0s loading, 102ms verification)  
Given Spielplatzdaten sind vorhanden  
returns a response which  
  has status code 200 (OK)  
  includes headers  
    "Content-Type" with value "application/json; charset=utf-8" (OK)  
  has a matching body (FAILED)  
  
Failures:  
  
1) Verifying a pact between PlaygroundConsumer and PlaygroundProvider Given Spielplatzd  
aten sind vorhanden - eine Anfrage für alle Spielplätze  
  1.1) has a matching body  
    $[0].properties.OBJECTID -> Expected '2225591' (String) to be the same type  
as 2225591 (Integer)  
  
There were 1 pact failures  
  
[05:19:41.799] ERROR (13636): pact-core@16.0.0: Verification unsuccessful  
Pact-Verifizierung fehlgeschlagen: Error: Verfication failed
```

- d) git add provider/server.js

- e) git commit -m "Bug 2: OBJECTID as false Type(string instead number)"

```
PS D:\DEV\TDD-UE04-V2> git add provider/server.js  
PS D:\DEV\TDD-UE04-V2> git commit -m "Bug 2: OBJECTID as false Type(string instead number)"  
[main 1019be4] Bug 2: OBJECTID as false Type(string instead number)  
1 file changed, 3 insertions(+), 1 deletion(-)  
PS D:\DEV\TDD-UE04-V2> git log --oneline  
1019be4 (HEAD -> main) Bug 2: OBJECTID as false Type(string instead number)  
50c81c5 Bug 1: BEZIRK missing in Response  
c94f30c Add Pact provider verification for playgrounds  
b023856 Add Pact consumer test with realistic playground structure  
75cc34b Add realistische Pact-Teststruktur für /spielplaetze  
baf0f53 Add empty consumer Pact test for getPlaygrounds  
63cf3f1 remove package-lock.json from .gitignore  
a598d13 Add Pact as dev dependency  
2ce82a5 Initial commit with .gitignore and project structure
```

Beispiel-Bug #3

- a) TYP_DETAIL fehlt (in Response)

// TYP_DETAIL: "Ballspielkäfig, Spielplatz",

```
properties: {  
  // Bug #2  
  // OBJECTID: "2225591",  
  OBJECTID: 2225591,  
  ANL_NAME: "Rudolf-Sallinger-Park",  
  BEZIRK: 5,  
  // Bug #1  
  //BEZIRK: 5,  
  SPIELPLATZ_DETAIL: "Fußball, Klettern, Rutschen, ...",  
  // Bug #3  
  //TYP_DETAIL: "Ballspielkäfig, Spielplatz",  
  SE_ANNO_CAD_DATA: null,  
},
```

- b) server starten: node provider/server.js

- c) in neuem Terminal: node provider/validatePlaygrounds.pact.test.js

```
Verifying a pact between PlaygroundConsumer and PlaygroundProvider  
  
eine Anfrage für alle Spielplätze (0s loading, 89ms verification)  
Given Spielplatzdaten sind vorhanden  
returns a response which  
  has status code 200 (OK)  
  includes headers  
    "Content-Type" with value "application/json; charset=utf-8" (OK)  
  has a matching body (FAILED)  
  
Failures:  
  
1) Verifying a pact between PlaygroundConsumer and PlaygroundProvider Given Spielplatzdaten sind vorhanden - ei  
ne Anfrage für alle Spielplätze  
  1.1) has a matching body  
    ${0}.properties -> Actual map is missing the following keys: TYP_DETAIL  
  
There were 1 pact failures
```

- d) git add provider/server.js

- e) git commit -m "Bug 3: TYP_DETAIL missing in Response"

```
● PS D:\DEV\TDD-UE04-V2> git add provider/server.js  
● PS D:\DEV\TDD-UE04-V2> git commit -m "Bug 3: TYP_DETAIL missing in Response"  
[main cf21332] Bug 3: TYP_DETAIL missing in Response  
 1 file changed, 4 insertions(+), 2 deletions(-)  
● PS D:\DEV\TDD-UE04-V2> git log --oneline  
cf21332 (HEAD -> main) Bug 3: TYP_DETAIL missing in Response  
1019be4 Bug 2: OBJECTID as false Type(string instead number)  
50c81c5 Bug 1: BEZIRK missing in Response  
c94f30c Add Pact provider verification for playgrounds  
b023856 Add Pact consumer test with realistic playground structure  
75cc34b Add realistische Pact-Teststruktur für /spielplaetze  
baf0f53 Add empty consumer Pact test for getPlaygrounds  
63cf3f1 remove package-lock.json from .gitignore  
a598d13 Add Pact as dev dependency  
2ce82a5 Initial commit with .gitignore and project structure
```

Weitere Schritte - Finalisierung

git add pacts/PlaygroundConsumer-PlaygroundProvider.json

git commit -m "Add generated Pact file for /spielplaetze contract"


```
PS D:\DEV\TDD-UE04-V2> git log --oneline
376b95d (HEAD -> main) Add generated Pact file for /spielplaetze contract
cf21332 Bug 3: TYP_DETAIL missing in Response
1019be4 Bug 2: OBJECTID as false Type(string instead number)
50c81c5 Bug 1: BEZIRK missing in Response
c94f30c Add Pact provider verification for playgrounds
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a598d13 Add Pact as dev dependency
2ce82a5 Initial commit with .gitignore and project structure
```

GREEN: Alle Bugs sind 'ge-fixed'

```
provider > JS server.js > ...
1  const express = require("express");
2  const app = express();
3  const PORT = 1235; // exakt dieser Port!
4
5  app.get("/spielplaetze", (req, res) => {
6    res.json([
7      {
8        type: "Feature",
9        id: "SPIELPLATZPUNKTOGD.2225591",
10       geometry: {
11         type: "Point",
12         coordinates: [16.36248055, 48.18779685],
13       },
14       geometry_name: "SHAPE",
15       properties: {
16         // Bug #2
17         // OBJECTID: "2225591",
18         OBJECTID: 2225591,
19         ANL_NAME: "Rudolf-Sallinger-Park",
20         BEZIRK: 5,
21         // Bug #1
22         //BEZIRK: 5,
23         SPIELPLATZ_DETAIL: "Fußball, Klettern, Rutschen, ...",
24         // Bug #3
25         //TYP_DETAIL: "Ballspielkäfig, Spielplatz",
26         TYP_DETAIL: "Ballspielkäfig, Spielplatz",
27         SE_ANNO_CAD_DATA: null,
28       },
29     ],
30   );
31 });
32
33 app.listen(PORT, () => {
34   console.log(`PlaygroundProvider läuft auf http://localhost:${PORT}`);
35 });
36
```

```
PS D:\DEV\TDD-UE04-V2> git add provider/server.js
● PS D:\DEV\TDD-UE04-V2> git commit -m "GREEN: Alle Bugs sind wieder 'ge-fixed'"
[main 86492a4] GREEN: Alle Bugs sind wieder 'ge-fixed'
1 file changed, 1 insertion(+)
● PS D:\DEV\TDD-UE04-V2> git log --oneline
86492a4 (HEAD -> main) GREEN: Alle Bugs sind wieder 'ge-fixed'
376b95d Add generated Pact file for /spielplaetze contract
cf21332 Bug 3: TYP_DETAIL missing in Response
1019be4 Bug 2: OBJECTID as false Type(string instead number)
50c81c5 Bug 1: BEZIRK missing in Response
c94f30c Add Pact provider verification for playgrounds
b023856 Add Pact consumer test with realistic playground structure
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baf0f53 Add empty consumer Pact test for getPlaygrounds
63cf3f1 remove package-lock.json from .gitignore
a598d13 Add Pact as dev dependency
2ce82a5 Initial commit with .gitignore and project structure
○ PS D:\DEV\TDD-UE04-V2>
```


Final – Git



```
PS D:\DEV\TDD-UE04-V2> git log --oneline
b7c767f (HEAD -> main) edited
516eb57 Add README.md
86492a4 GREEN: Alle Bugs sind wieder 'ge-fixed'
376b95d Add generated Pact file for /spielplaetze contract
cf21332 Bug 3: TYP_DETAIL missing in Response
1019be4 Bug 2: OBJECTID as false Type(string instead number)
50c81c5 Bug 1: BEZIRK missing in Response
c94f30c Add Pact provider verification for playgrounds
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baf0f53 Add empty consumer Pact test for getPlaygrounds
63cf3f1 remove package-lock.json from .gitignore
a598d13 Add Pact as dev dependency
2ce82a5 Initial commit with .gitignore and project structure
PS D:\DEV\TDD-UE04-V2> 
```