



iPhoneGames

SUMMIT

Nuts & Bolts of
Internet
Multiplayer
iPhone Game
Testing

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A DIVISION OF UNITED BUSINESS MEDIA LLC

GDC 10

www.GDConf.com



This is Phil

P	Ship	Pr	%%	Owner	P	Ship	Pr	%%	Owner
A	75	10	40	Phil	U				
B	75	10	34	Ian	V				
C	75	10	40	Ian	W				
D	75	10	40	Kurt	X				
E	45	8	32	Ian	Y				
F					Z				
G					1				
H					2				
I					3				
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				1									X		

Turn # 8 / 30

Phil

From :

this game, I think you should all send him 10 dollars. (He would love it) The

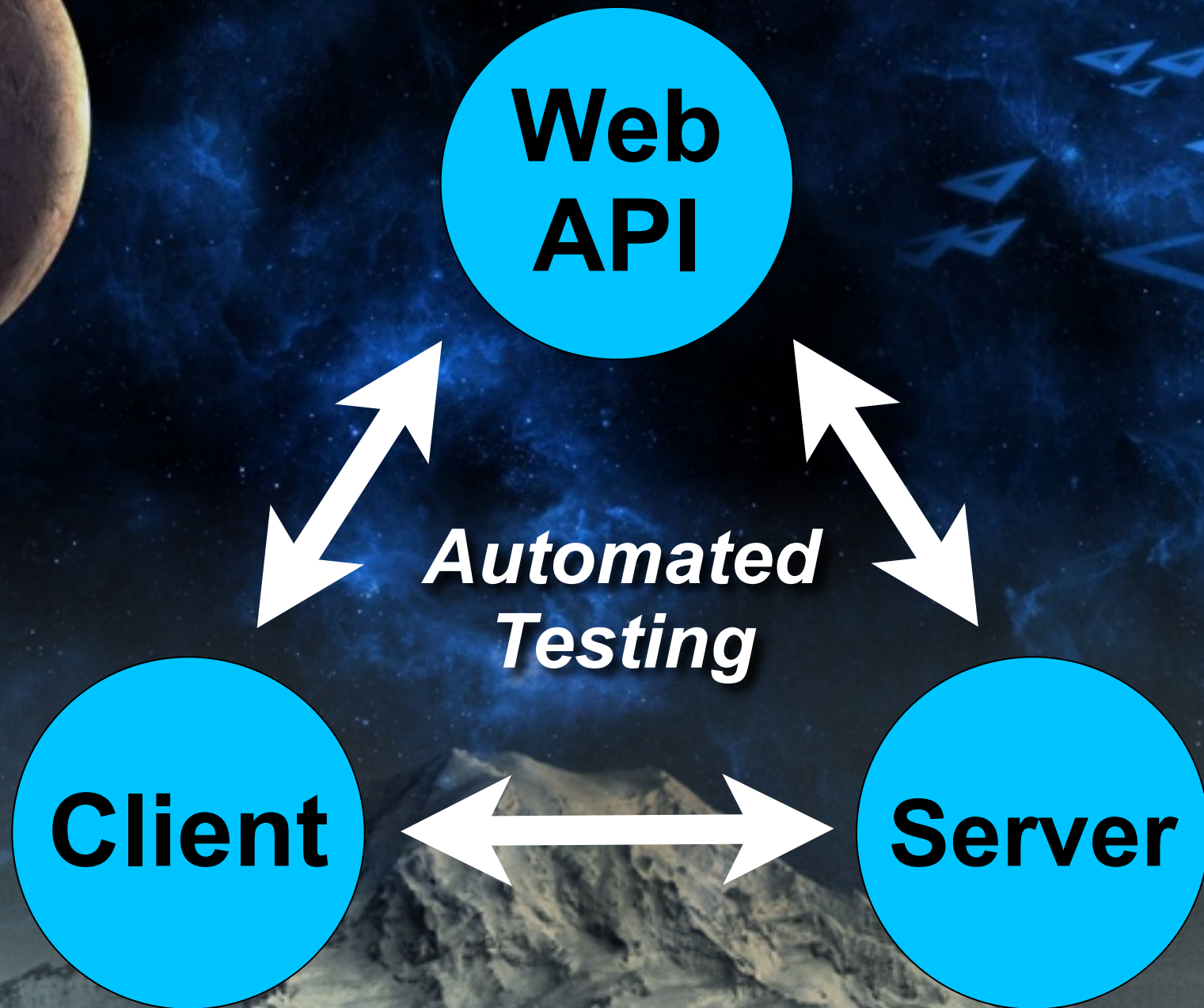
1987: Galactic Conquest



GALCON - Multiplayer

Why Testing?

- Galcon - a top 25 game
- 120 simultaneous users
- Ready for 1200+ users
- Developed by just me
- Almost no beta testing



Web API

- A ton of work
- 3rd party options
- Hybrid approach
- Testable Web API

How I did it ..

- **LAMP (Linux + Apache + MySQL + PHP)**
- **Port-from-desktop**
- **Benefits of LAMP**
- **Simple PHP scripted tests**



The Client Core

- Testable
- Reentrant
- No UI
- No Apple in your core



Client API

- User Authentication
- Game List
- Friends features
- PHP scripted tests



The Server

- Sockets are hard!
- Enet - <http://enet.bespin.org/>
- Built on the client
- LAN / Bluetooth



Servers

>> Search <<

Local

Omega9-2v2 - 0/4

Internet

Beta1 - 0/2

Internet

Alpha8 - 0/4

Internet



Chi9 - 3/4

Internet



Alpha4 - 3/4

Internet



Alpha7 - 3/4

Internet



Alpha5 - 3/4

Internet

Menu

Refresh

Server API

- Register server
- Update user list
- Send in game stats
- Unregister server

Automated Testing

- Network coding is hard
- No recurring bugs
- Enhance with confidence
- Please your customers
- Please Apple

Setup

```
#define TEST_SETUP \  
fprintf(stdout, "\n===== \n"); \  
fprintf(stdout, "[%s:%d] %s() ... \n", \  
__FILE__, __LINE__, __func__); \  
gc_init(server, 0); \  
gc_init(client, 0); \  
gc_init(client2, 0);
```



Make `em Fast

```
#define T(t) \  
    for (_t =0; _t< t; _t++) { \  
        gc_server_loop(server); \  
        gc_engine_loop(client); \  
        gc_engine_loop(client2); \  
    }
```

Make Assertions

```
#define ASSERT(v) \
if (!(v)) { \
    fprintf(stderr, "FAIL!!\n"); \
    __FILE__, __LINE__, __func__ \
    exit(-1); \
}
```

KEEP OUT
EXPERIMENT
IN
PROGRESS

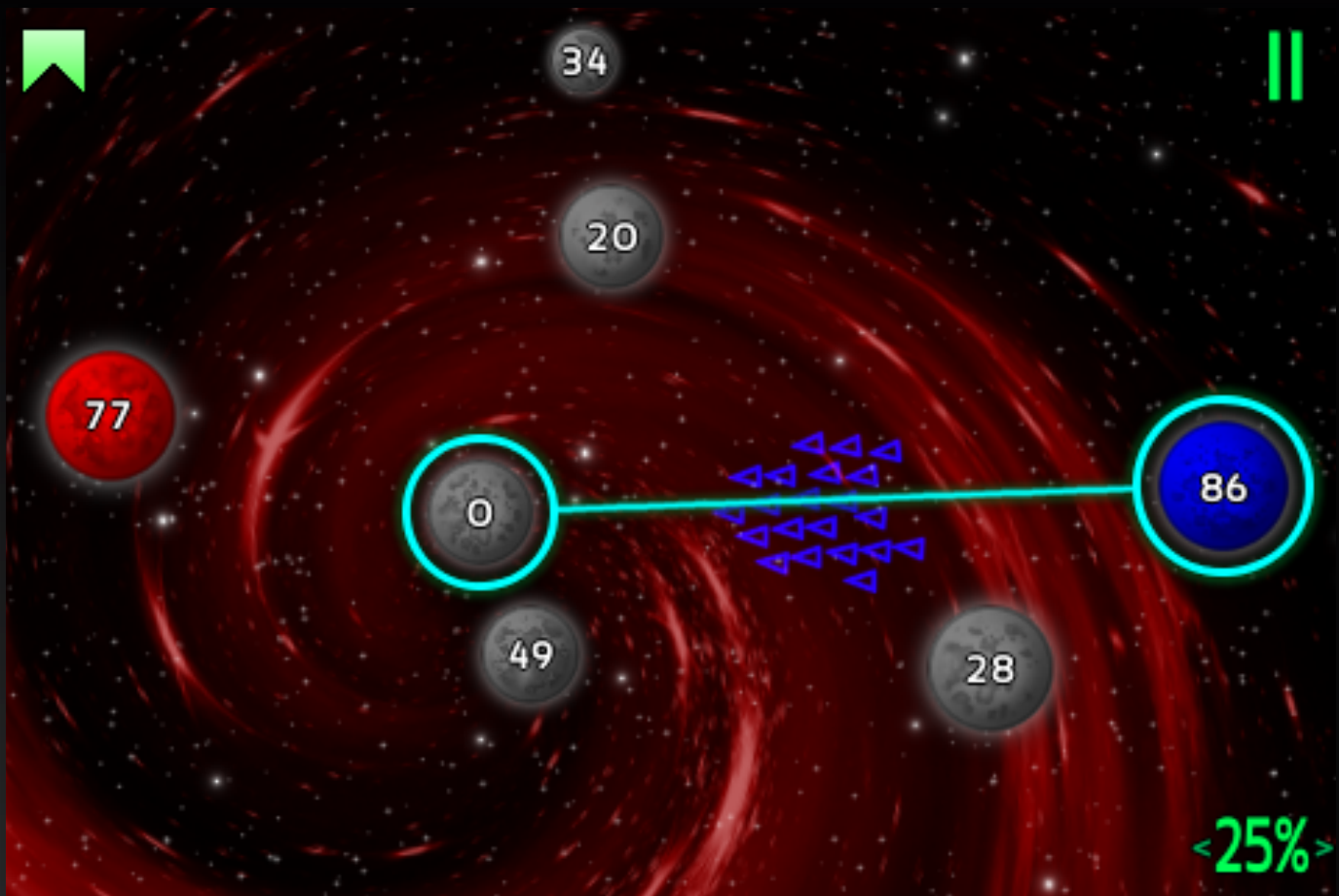
Teardown

```
#define TEST_END \  
    gc_deinit(client2,0); \  
    gc_deinit(client,0); \  
    gc_deinit(server,0);
```

www.valgrind.org

Case Study: TDD

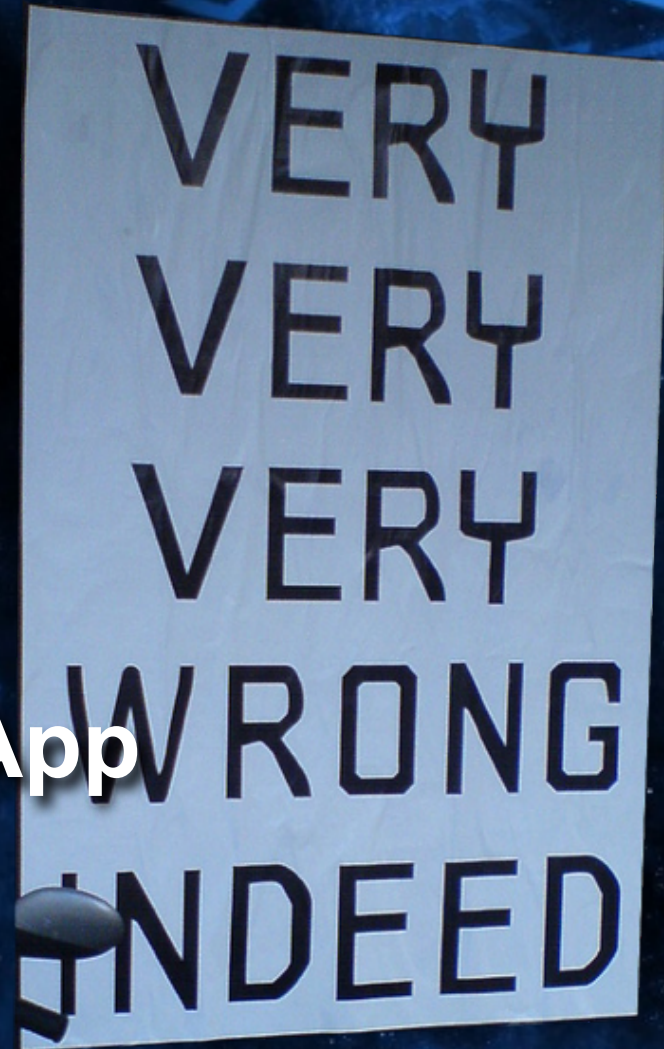
```
TEST_SETUP;  
gc_client_start(client); T(1);  
gc_client_attack(client,100,0,3); T(1);  
ASSERT(_test_count_fleets(server,1) == 1);  
ASSERT(_test_count_fleets(client,1) == 1);  
T(GC_FPS*30);  
ASSERT(_test_count_fleets(server,1) == 0);  
ASSERT(_test_count_fleets(client,1) == 0);  
ASSERT(_test_count_planets(client,1) == 2);  
TEST_TEARDOWN;
```



TDD: Basic Attack

Case: User List Bug

- 4 players, 10 user lists
- What went wrong ...
- Reproduced with test
- Server-side fix, so no App update required!



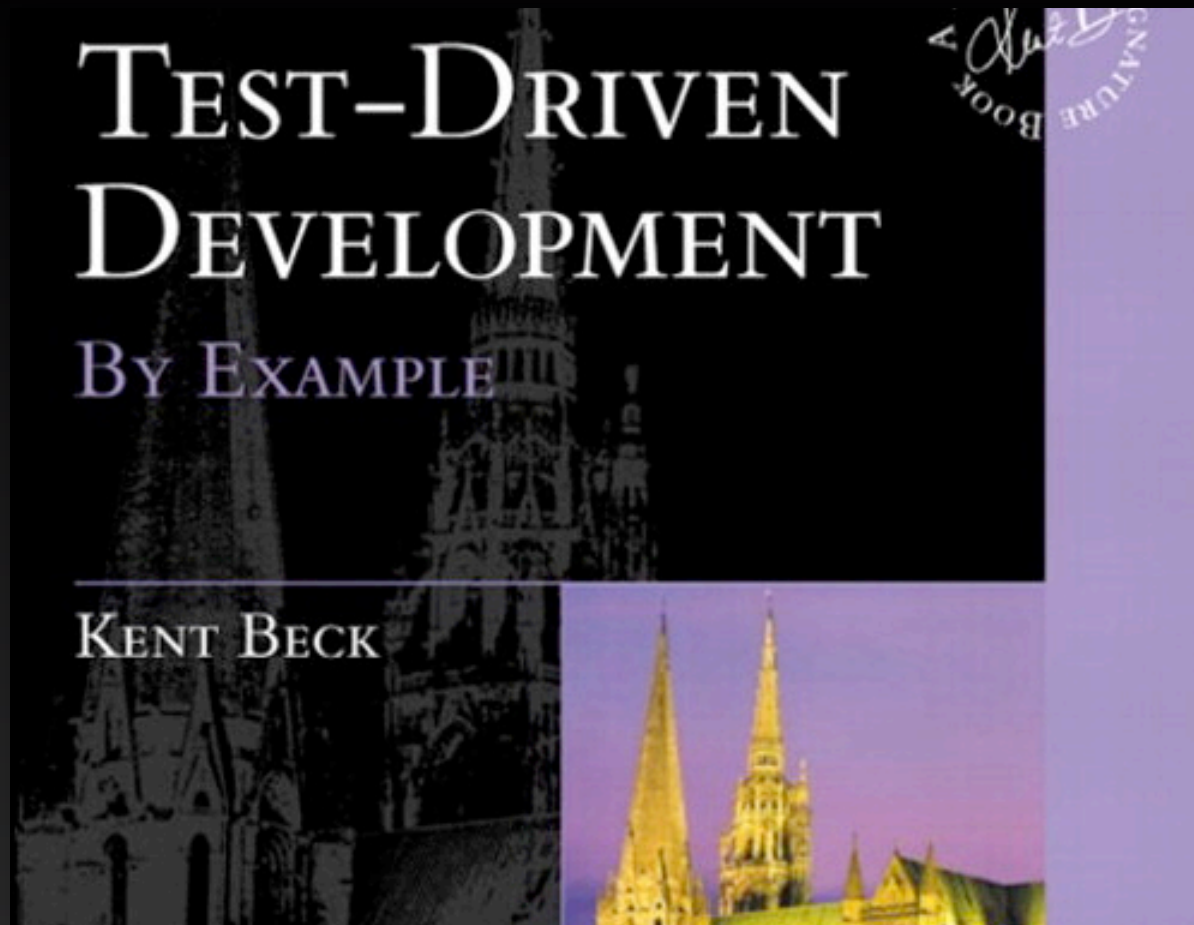
Case: Adding 2v2

- **Wanted: 2v2 Games**
- **Shoehorning it into our existing protocol**
- **Using TDD to develop the feature with 5 backwards compatible tests**

The 2v2 Test Suite

```
test_2v2_require_4start();  
test_2v2_team_win();  
test_2v2_see_teammate_ships();  
test_2v2_teammate_leaves();  
test_2v2_team_reinforce();
```





The Kent Beck Book

Questions?

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