



Maintaining PJM Tool Availability

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Concurrent Sessions

- Limit the number of concurrent authenticated sessions (tokens)

Usage Rates

- Limit the request rates against the PJM tools

1. Deny access

- 26th attempt is unsuccessful

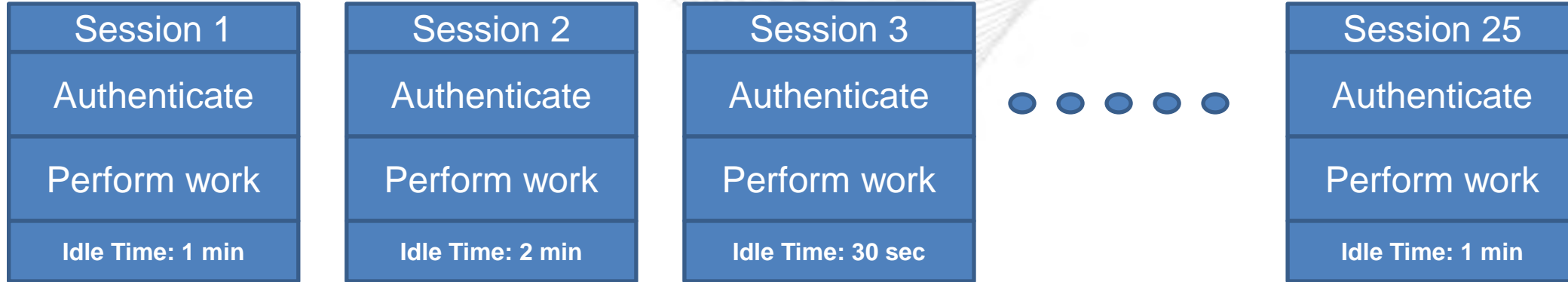
2. Invalidate next expiring session

- Session with longest inactivity time is destroyed on 26th attempt

3. Invalidate oldest session

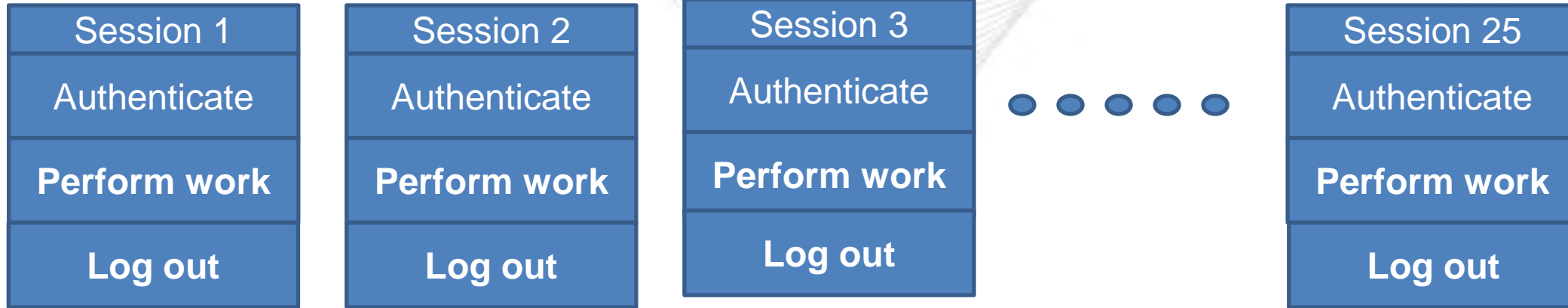
- 1st created session is destroyed on 26th attempt

- Quick or single interaction transactions like downloading data
- Long running transactions – decision making, multiple interactions





Least recently used session (#2) is invalidated

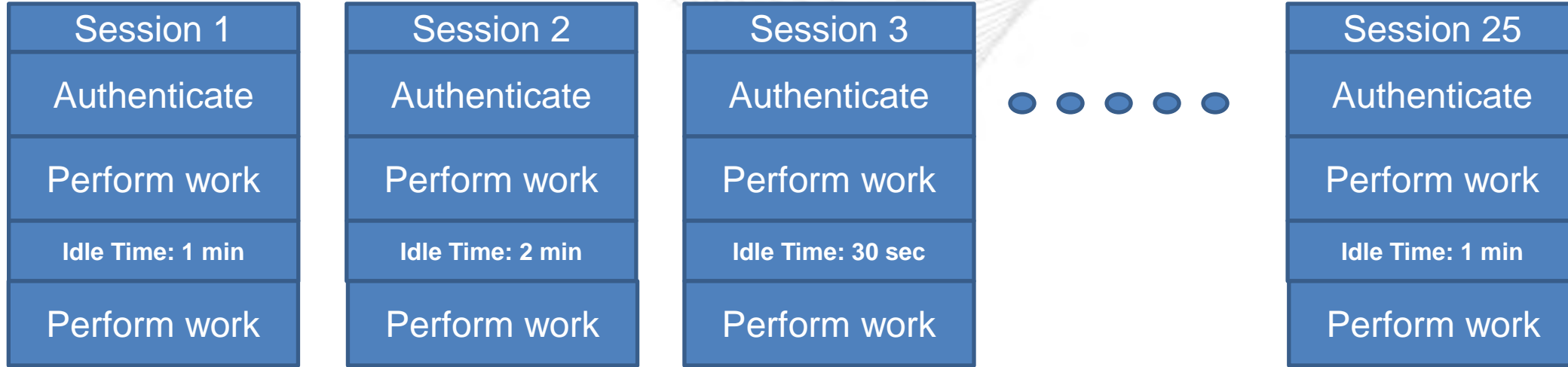


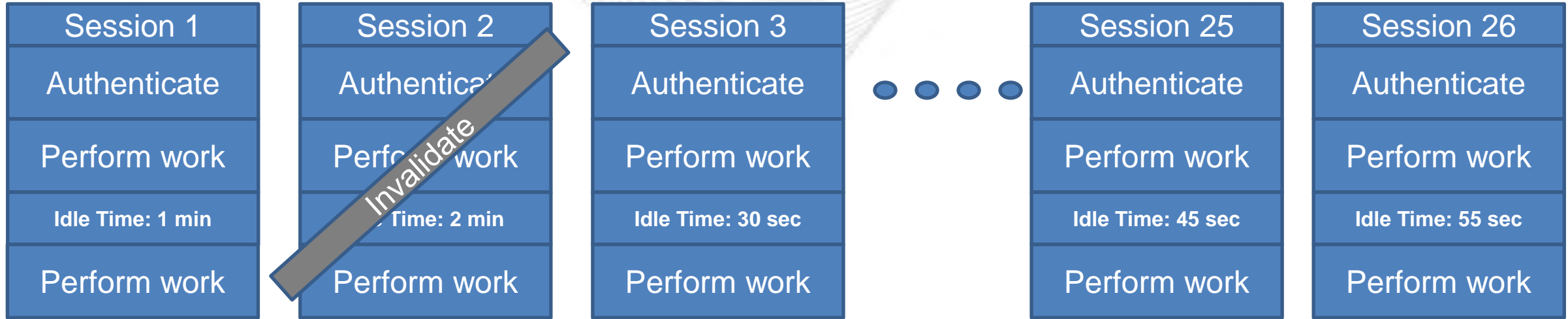


Pseudo code – Quick transactions

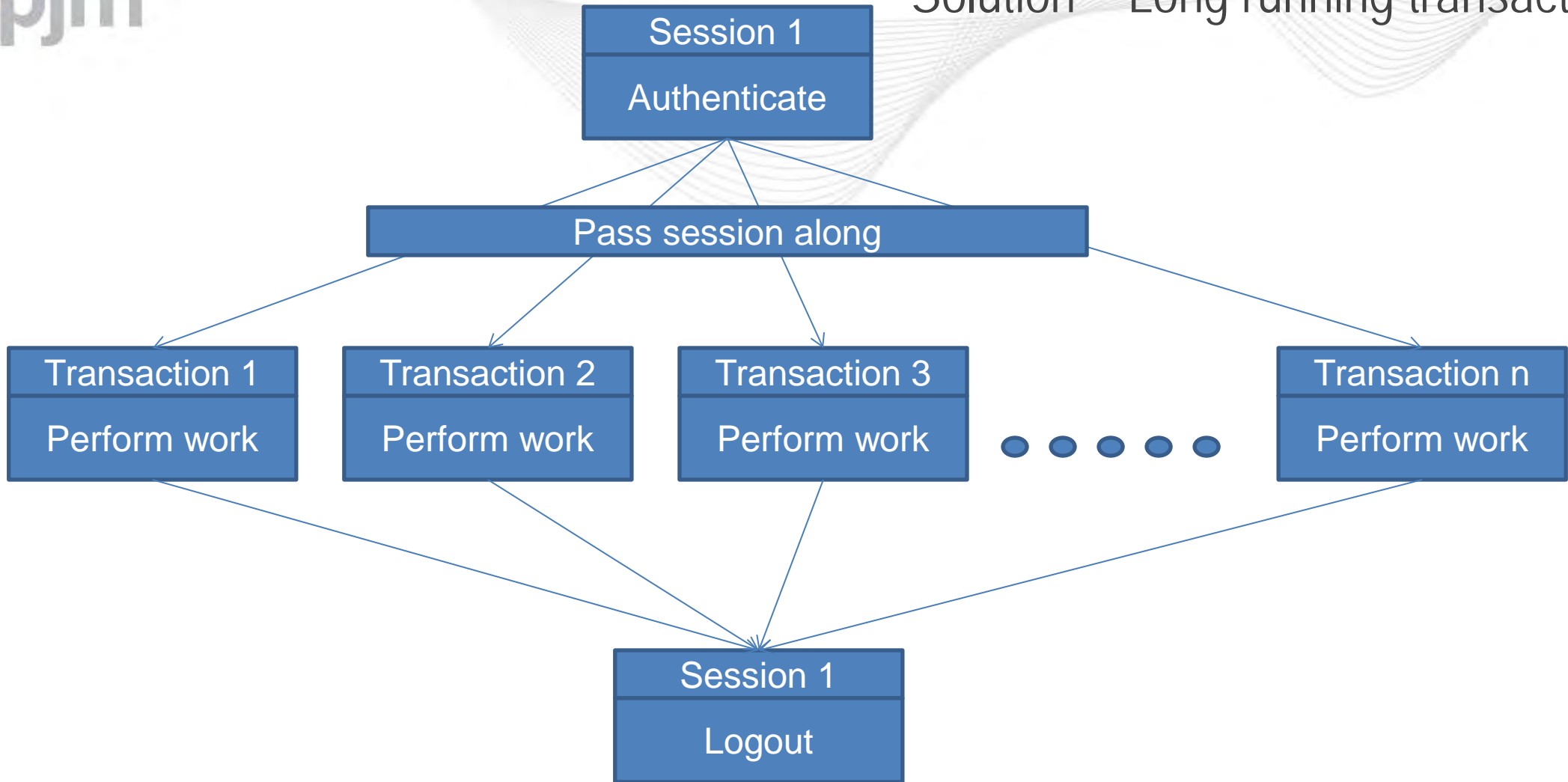
```
authenticate(username, password) {  
    Get token from sso.pjm.com/access/authenticate  
    Return Token  
}  
logout(token) {  
    Log out token from sso.pjm.com/access/logout  
}  
transaction 1(){  
    token = authenticate(username, password)  
    do work  
    logout(token)  
}  
transaction n(){  
    token = authenticate(username, password)  
    do work  
    logout(token)  
}
```

```
Main(){  
    transaction 1(username, password)  
    transaction n(username, password)  
}
```



- Least recently used session (#2) is invalidated
- Perform work step will fail if it starts after invalidation occurs – re-authentication will be required





Pseudo code - Long running transactions

```
authenticate(username, password) {  
    Get token from sso.pjm.com/access/authenticate  
    Return Token  
}  
transaction 1(token){  
    do work  
}  
  
transaction 2(token){  
    do work  
}  
  
logout(token) {  
    Log out token from sso.pjm.com/access/logout  
}
```

```
Main(){  
    token=authenticate(username, password)  
    transaction 1(token)  
    transaction 1(token)  
    logout(token)  
}
```

- October
 - Begun connecting with users
 - 10/24 - Implemented in Train
- November
 - 11/29 - Implement in Production

- Corrections
 - Markets Gateway: 1600 requests/minute
 - Oasis.pjm.com: 1200 requests/minute