

รายการอ้างอิง

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ภาคผนวก

Source Code สำหรับโปรแกรม MATLAB 7.8.0 (R2009a)

โปรแกรมที่ใช้แสดงผลการทดสอบในบทที่ 4

1. เทคนิคการจองแบบ FPT

```

clear all; clc
no_trial = 100000;
M = 8; N = 16;
permission_probability = 0.05:0.05:1;
all_avg_success = [];
for p = permission_probability
    total_success = 0;
    for h = 1:no_trial
        no_user = M;
        no_success = 0;
        for k = 1:N
            no_access = sum(rand(1,no_user)<p);
            if no_access == 1
                no_user = no_user-1;
                no_success = no_success + 1 ;
            end
        end
        total_success = total_success + no_success;
    end % h
    all_avg_success = [all_avg_success
total_success/no_trial];
end % p

```

2. เทคนิคการจองแบบ FPT+MP

```

no_trial = 100000;
N = 16; p1 = 0.20;
permission_probability_class2 = 0.05:0.05:1;
all_avg_success_c1 = [];
all_avg_success_c2 = [];
for p2 = permission_probability_class2
    total_success1 = 0;
    total_success2 = 0;
    for h = 1:no_trial
        no_success1 = 0; no_success2 = 0;
        no_user_c1 = 1; no_user_c2 = 7;
        for k = 1:N
            no_access1 = sum( rand(1,no_user_c1)<p1 );
            no_access2 = sum( rand(1,no_user_c2)<p2 );
            if (no_access1 + no_access2) == 1
                if no_access1 == 1
                    no_user_c1 = no_user_c1-1;
                    no_success1 = no_success1 + 1 ;
                end
                if no_access2 == 1
                    no_user_c2 = no_user_c2-1;
                    no_success2 = no_success2 + 1 ;
                end
            end
        end
    end
end % k

```

```

        total_success1 = total_success1 + no_success1;
        total_success2 = total_success2 + no_success2;
    end % h
    all_avg_success_c1 = [all_avg_success_c1
total_success1/no_trial];
    all_avg_success_c2 = [all_avg_success_c2
total_success2/no_trial];
end % p2

```

3. เทคนิคการจองแบบ FPT+MLT

```

no_trial = 100000;
N = 16; T = 16; % T = Token
p1 = 0.20; p2 = 0.20;
all_avg_success_c1 = [];
all_avg_success_c2 = [];
for token_class_2 = 1:T
    total_success1 = 0;
    total_success2 = 0;
    for h = 1:no_trial
        no_success1 = 0;
        no_user_c1 = 1; no_user_c2 = 7;
        token_2 = token_class_2*ones(1,no_user_c2);
        success_status_2 = zeros(1,no_user_c2);
        for k = 1:N
            no_access1 = sum(rand(1,no_user_c1)<p1);
            access2 = rand(1,no_user_c2)<p2;
            chkToken_2 = (token_2 > 0);
            no_access2 = sum(access2.*chkToken_2);
            if (no_access1 + no_access2) == 1
                if no_access1 == 1
                    no_user_c1 = no_user_c1-1;
                    no_success1 = no_success1 +1;
                end
                if no_access2 == 1
                    reset_token = find(access2);
                    token_2(reset_token) = 0;
                    success_status_2 = success_status_2 + access2;
                end
            end
            token_2 = token_2 - access2;
        end % k
        total_success1 = total_success1 + no_success1 ;
        success_status_2 = (success_status_2 > 0);
        no_success2 = sum(success_status_2);
        total_success2 = total_success2 + no_success2 ;
    end % h
    all_avg_success_c1 = [all_avg_success_c1
total_success1/no_trial];
    all_avg_success_c2 = [all_avg_success_c2
total_success2/no_trial];
end % token_class_2

```

4. เทคนิคการจองแบบ FPT+PCP

```

no_trial = 100000;

```

```

N = 16; p1 = 0.20; p2 = 0.20;
all_avg_success_c1 = [];
all_avg_success_c2 = [];
for N_1 = 1:N
    total_success1 = 0;
    total_success2 = 0;
    for h = 1:no_trial
        no_success1 = 0; no_success2 = 0;
        no_user_c1 = 1; no_user_c2 = 7;
        for j = 1:N_1 % user class 1
            no_access1 = sum( rand(1,no_user_c1)<p1 ) ;
            if no_access1 == 1
                no_user_c1 = no_user_c1-1;
                no_success1 = no_success1 + 1 ;
            end
        end
        for k = 1:N-N_1 % user class 2
            no_access2 = sum( rand(1,no_user_c2)<p2 ) ;
            if no_access2 == 1
                no_user_c2 = no_user_c2-1;
                no_success2 = no_success2 + 1 ;
            end
        end
        total_success1 = total_success1 + no_success1;
        total_success2 = total_success2 + no_success2;
    end % h
    all_avg_success_c1 = [all_avg_success_c1
total_success1/no_trial];
    all_avg_success_c2 = [all_avg_success_c2
total_success2/no_trial];
end % N_1

```

5. เทคนิคการจอบแบบ FPT+SCS

```

no_trial = 100000;
N = 16; p1 = 0.20; p2 = 0.20;
all_avg_success_c1 = [];
all_avg_success_c2 = [];
for N_s = 1:N
    total_success1 = 0;
    total_success2 = 0;
    for h = 1:no_trial
        no_success1 = 0; no_success2 = 0;
        no_user_c1 = 1; no_user_c2 = 7;
        for k = 1:N
            no_access1 = sum( rand(1,no_user_c1)<p1 ) ;
            % ===== only class-1 users are contention =====
            if k <= N_s
                if no_access1 == 1
                    no_user_c1 = no_user_c1-1;
                    no_success1 = no_success1 + 1 ;
                end
            else
                % ===== class-1 and class-2 users contention =====
                no_access2 = sum( rand(1,no_user_c2)<p2 ) ;
                if (no_access1 + no_access2) == 1

```

```

        if no_access1 == 1
            no_user_c1 = no_user_c1-1;
            no_success1 = no_success1 + 1 ;
        end
        if no_access2 == 1
            no_user_c2 = no_user_c2-1;
            no_success2 = no_success2 + 1 ;
        end
    end
end
end % k
total_success1 = total_success1 + no_success1;
total_success2 = total_success2 + no_success2;
end % h
all_avg_success_c1 = [all_avg_success_c1
total_success1/no_trial];
all_avg_success_c2 = [all_avg_success_c2
total_success2/no_trial];
end % N_s

```

6. เทคนิคการจองแบบ FPT+HFF

```

no_trial = 100000; N = 16;
p1 = 0.20; p2 = 0.20;
no_user_c1 = 1; no_user_c2 = 7;
total_success1 = 0;
total_success2 = 0;
for h = 1:no_trial
    m1 = no_user_c1; no_success1 = 0;
    m2 = no_user_c2; no_success2 = 0;
    for k = 1:N
        if m1 > 0;
            no_access1 = sum( rand(1,m1)<p1 );
            if no_access1 == 1
                m1 = m1-1;
                no_success1 = no_success1 + 1 ;
            end
        else
            no_access2 = sum( rand(1,m2)<p2 );
            if no_access2 == 1
                m2 = m2-1;
                no_success2 = no_success2 + 1 ;
            end
        end
    end
    total_success1 = total_success1 + no_success1;
    total_success2 = total_success2 + no_success2;
end
avg_success1 = total_success1/no_trial;
avg_success2 = total_success2/no_trial;

```

โปรแกรมที่ใช้แสดงผลการทดสอบในบทที่ 6 (CFP)

1. เทคนิคการจองแบบ CFP

```

clear all; clc
N = 16; M = 8;

```

```

permission_prob = 0.05:0.05:1;
all_prob_success = [];
for p = permission_prob
    prob_success = 0;
    for i = 1:N
        prob_success = prob_success + (p*(1-p)^(i-1))*(1-(p*(1-p)^(i-1)))^M ;
    end
    all_prob_success = [all_prob_success prob_success];
end

```

2. สถานการณ์แบบ CPP

```

clear all; clc
N = 16; M1 = 1; M2 = 7;
permission_prob_misbehaved = 0.05:0.05:1;
p1 = 0.15; % appropriate permission probability
all_prob_success_wellbehaved = [];
all_prob_success_misbehaved = [];
for p2 = permission_prob_misbehaved
    prob_success_wellbehaved = 0;
    prob_success_misbehaved = 0;
    for i = 1:N
        prob_success_wellbehaved = prob_success_wellbehaved +
        ((p1*(1-p1)^(i-1))*(1-(p1*(1-p1)^(i-1)))^(M1-1))*((1-(p2*(1-p2)^(i-1)))^M2) ;
        prob_success_misbehaved = prob_success_misbehaved +
        ((p2*(1-p2)^(i-1))*(1-(p2*(1-p2)^(i-1)))^(M2-1))*((1-(p1*(1-p1)^(i-1)))^M1) ;
    end
    all_prob_success_wellbehaved = [all_prob_success_wellbehaved
    prob_success_wellbehaved];
    all_prob_success_misbehaved = [all_prob_success_misbehaved
    prob_success_misbehaved];
end

```

3. สถานการณ์แบบ CPP+SRT

```

clear all; clc
N = 16; M1 = 7; M2 = 1;
permission_prob_misbehaved = 0.05:0.05:1;
p1 = 0.15; % appropriate permission probability
N_d = N/4; % the number of shifted reservation slots
all_prob_success_wellbehaved = [];
all_prob_success_misbehaved = [];
for p2 = permission_prob_misbehaved
    prob_success_wellbehaved = 0;
    prob_success_misbehaved = 0;
    for i = 1:N
        if i <= N_d
            prob_success_wellbehaved = prob_success_wellbehaved +
            (p1*(1-p1)^(i-1))*(1-(p1*(1-p1)^(i-1)))^(M1-1) ;
        else % (i > N_d)
            prob_success_wellbehaved = prob_success_wellbehaved +
            ((p1*(1-p1)^(i-1))*(1-(p1*(1-p1)^(i-1)))^(M1-1))*((1-(p2*(1-p2)^(i-N_d)))^M2) ;
        end
    end
end

```

```

    prob_success_misbehaved = prob_success_misbehaved + ((p2*(1-
p2)^(i-N_d))*(1-(p2*(1-p2)^(i-N_d)))^(M2-1))*((1-(p1*(1-
p1)^(i-1)))^M1);
        end
    end
    all_prob_success_wellbehaved =
[all_prob_success_wellbehaved prob_success_wellbehaved];
    all_prob_success_misbehaved =
[all_prob_success_misbehaved prob_success_misbehaved];
end

```

โปรแกรมที่ใช้แสดงผลการทดสอบในบทที่ 6 (FPT)

1. สถานการณ์ที่มีการเปลี่ยนแปลงค่าความน่าจะเป็นการอนุญาตส่งแพ็กเก็ตการจอง

```

clear all; clc
no_trial = 100000;
N = 8; p1 = 0.15;
prob2 = 0.05:0.05:1;
all_avg_success_c1 = [];
all_avg_success_c2 = [];
for p2 = prob2
    total_success1 = 0;
    total_success2 = 0;
    for h = 1:no_trial
        no_success1 = 0;    no_success2 = 0;
        no_user_c1 = 7;    no_user_c2 = 1;
        for k = 1:N
            no_access1 = sum( rand(1,no_user_c1)<p1 );
            no_access2 = sum( rand(1,no_user_c2)<p2 );
            if (no_access1 + no_access2) == 1
                if no_access1 == 1
                    no_user_c1 = no_user_c1-1;
                    no_success1 = no_success1 + 1 ;
                end
                if no_access2 == 1
                    no_user_c2 = no_user_c2-1;
                    no_success2 = no_success2 + 1 ;
                end
            end
        end
        end % k
        total_success1 = total_success1 + no_success1;
        total_success2 = total_success2 + no_success2;
    end % h
    all_avg_success_c1 = [all_avg_success_c1
total_success1/(no_trial*no_user_c1)];
    all_avg_success_c2 = [all_avg_success_c2
total_success2/(no_trial*no_user_c2)];
end % p2

```

2. สถานการณ์ที่มีการเปลี่ยนแปลงค่าความน่าจะเป็นการอนุญาตส่งแพ็กเก็ตการจอง และจำนวนสล็อตการจองที่ถูกเลื่อน

```
clear all; clc;
```

```

N = 8; p = 0.15;
no_trial = 100000;
shift_slot = 3*N/4 ; % [ N/2 N/4]
all_avg_success_c1 = [];
all_avg_success_c2 = [];
for p2 = 0.05:0.05:1
    total_success1 = 0;
    total_success2 = 0;
    for h = 1:no_trial
        no_success1 = 0; no_success2 = 0;
        no_user_c1 = 7; no_user_c2 = 1;
        for k = 1:N
            % ===== only class-1 users are contention =====
            access1 = rand(1,no_user_c1)<p ;
            no_access1 = sum(access1);
            if k <= shift_slot
                if no_access1 == 1
                    no_user_c1 = no_user_c1-1;
                    no_success1 = no_success1 + 1 ;
                end
            else
                % ===== class-1 and class-2 users contention =====
                access2 = rand(1,no_user_c2)<p2 ;
                no_access2 = sum(access2);
                if (no_access1 + no_access2) == 1
                    if no_access1 == 1
                        no_user_c1 = no_user_c1-1;
                        no_success1 = no_success1 + 1 ;
                    end
                    if no_access2 == 1
                        no_user_c2 = no_user_c2-1;
                        no_success2 = no_success2 + 1 ;
                    end
                end
            end
        end
        end % slot_class_1
        total_success1 = total_c1 + no_success1;
        total_success2 = total_success2 + no_success2;
    end % h
    all_avg_success_c1 = [all_avg_success_c1
total_success1/no_trial];
    all_avg_success_c2 = [all_avg_success_c2
total_success2/no_trial];
end % p2

```

ประวัติผู้เขียนวิทยานิพนธ์

นายนรรัตน์ วัฒนมงคล เกิดเมื่อวันที่ 29 สิงหาคม พ.ศ. 2522 สำเร็จการศึกษาปริญญาวิศวกรรมศาสตรบัณฑิต ภาควิชาวิศวกรรมไฟฟ้า คณะวิศวกรรมศาสตร์ มหาวิทยาลัยขอนแก่น ในปีการศึกษา 2544 และได้เข้าทำงานในบริษัทเอกชนแห่งหนึ่งเป็นเวลา 2 ปี จากนั้นได้เข้าศึกษาต่อและสำเร็จการศึกษาปริญญาวิทยาศาสตรมหาบัณฑิต ภาควิชาวิศวกรรมไฟฟ้า คณะวิศวกรรมศาสตร์ มหาวิทยาลัยเทคโนโลยีพระจอมเกล้าธนบุรี ในปีการศึกษา 2548 จากนั้นได้เข้าศึกษาต่อในหลักสูตรวิทยาศาสตรดุษฎีบัณฑิต ภาควิชาวิศวกรรมไฟฟ้า คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย เมื่อ พ.ศ. 2549

