Remise devoir 2
Assurance qualité logicielle
SEG 3503

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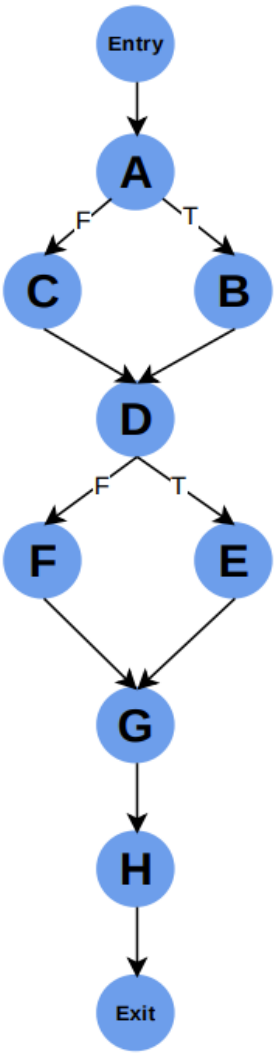
Exercice 1

Question 1.1:

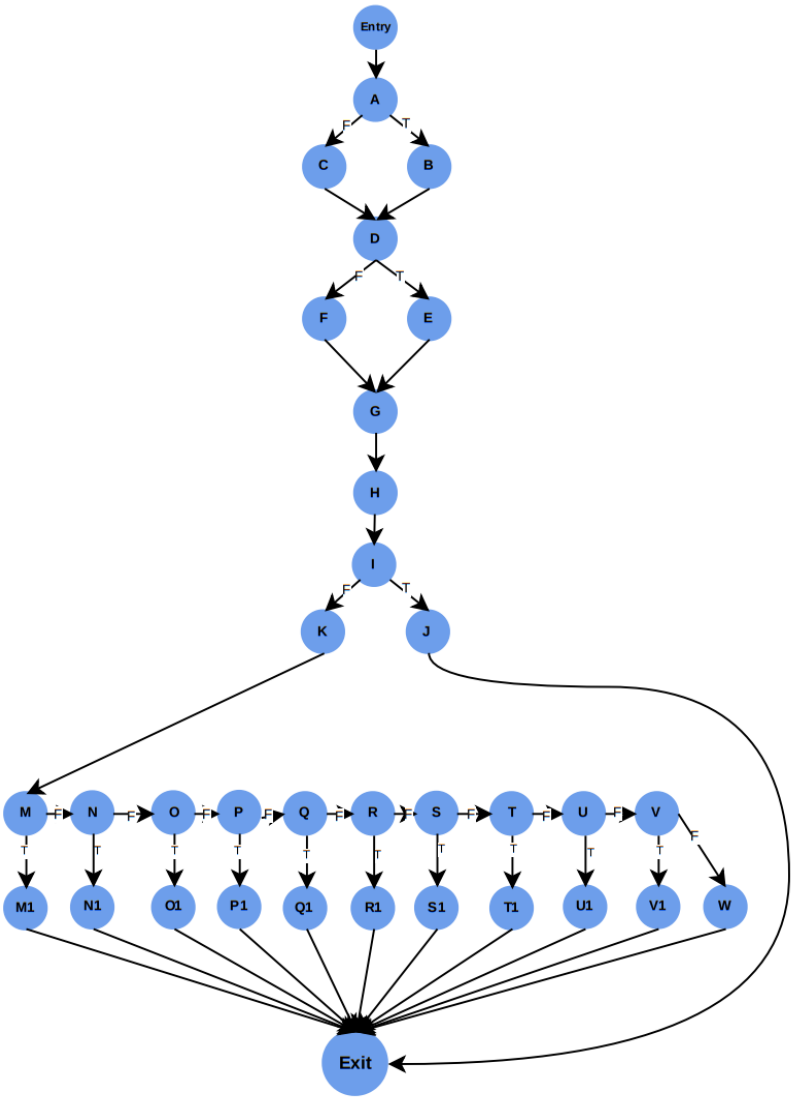
Pour la méthode pourcentage_grade:

```elixir
def percentage_grade(%{homework: homework, labs: labs, midterm: midterm, final: final}) do #Entry
  avg_homework =
    if Enum.count(homework) == 0 do #A
      0 #B
    else
      Enum.sum(homework) / Enum.count(homework) #C
    end

  avg_labs =
    if Enum.count(labs) == 0 do #D
      0 #E
    else
      Enum.sum(labs) / Enum.count(labs) #F
    end

  mark = 0.2 * avg_labs + 0.3 * avg_homework + 0.2 * midterm + 0.3 * final #G
  round(mark * 100) #H
end #Exit
```



Pour les méthodes letter_grade et numeric_grade:

```elixir
def letter_grade(%{homework: homework, labs: labs, midterm: midterm, final: final}) do #Entry
  avg_homework =
    if Enum.count(homework) == 0 do #A
      0 #B
    else
      Enum.sum(homework) / Enum.count(homework) #C
    end

  avg_labs =
    if Enum.count(labs) == 0 do #D
      0 #E
    else
      Enum.sum(labs) / Enum.count(labs) #F
    end

  avg_exams = (midterm + final) / 2 #G

  num_labs = #H
    labs
    |> Enum.reject(fn mark -> mark < 0.25 end)
    |> Enum.count()

  if avg_homework < 0.4 || avg_exams < 0.4 || num_labs < 3 do #I
    "EIN" #J
  else
    mark = 0.2 * avg_labs + 0.3 * avg_homework + 0.2 * midterm + 0.3 * final #K

    cond do
    #M
      mark > 0.895 ->
        "A+" #N1
    #N
      mark > 0.845 ->
        "A" #O1
    #O
      mark > 0.795 ->
        "A-" #P1
    #P
      mark > 0.745 ->
        "B+" #Q1
    #Q
      mark > 0.695 ->
        "B" #R1
    #R
      mark > 0.645 ->
        "C+" #S1
    #S
      mark > 0.595 ->
        "C" #T1
    #T
      mark > 0.545 ->
        "D+" #U1
    #U
      mark > 0.495 ->
        "D" #V1
    #V
      mark > 0.395 ->
        "E" #W

      :else ->
        "F" #W
    end
  end
end #Exit
```



Question 1.2:

Percentage Grade method

Test Case Number	Test Data	Expected results	Conditions Covered	Branches Covered
0	homework: [0.8] labs: [1, 1, 1] midterm: 0.70 final: 0.9	85	Condition A is True Condition D is True **2/4**	Branch A: True Branch D: True **2/4**
1	homework: [] labs: [] midterm: 1 final: 1	50	Condition A is False Condition D is False **4/4**	Branch A: False Branch D: False **4/4**
			100% 4/4	**100% 4/4**

Letter Grade & Numeric grade methods

Test Case Number	Test Data	Expected results	Conditions Covered	Branches Covered
0	homework: [] labs: [] midterm: 0.39 final: 0.39	“EIN”	Condition A is True Condition D is True (Conditions I1, I2, I3 are True) **5/30**	Branch A: True Branch D: True Branch I: True **3/26**
1	homework: [0.4] labs: [0.25,0.25,0.25] midterm: 0.4 final: 0.4	“F”/0	Condition A is False Condition D is False (Conditions I1, I2, I3 are False) Condition M is False Condition N is False Condition O is False	Branch A: False Branch D: False Branch I: False Branch M: False Branch N: False Branch O: False Branch P: False Branch Q: False Branch R: False Branch S: False Branch T: False

			Condition P is False Condition Q is False Condition R is False Condition S is False Condition T is False Condition U is False Condition V is False **5/30 + 15/30 = 20/30**	Branch U: False Branch V: False **13/26 + 3/26 = 16/26**
2	homework: [0.4,0.4,0.4] labs: [0.4,0.4,0.4] midterm: 0.5 final: 0.5	“E”/1	Condition A is False Condition D is False (Conditions I1, I2, I3 are False) Condition M is False Condition N is False Condition O is False Condition P is False Condition Q is False Condition R is False Condition S is False Condition T is False Condition U is False Condition V is True **20/30 + 1/30 = 21/30**	Branch A: False Branch D: False Branch I: False Branch M: False Branch N: False Branch O: False Branch P: False Branch Q: False Branch R: False Branch S: False Branch T: False Branch U: False Branch V: True **16/26 + 1/26 = 17/26**
3	homework: [0.5,0.5,0.5] labs: [0.5,0.5,0.5] midterm: 0.5 final: 0.5	“D”/2	Condition A is False Condition D is False (Conditions I1, I2, I3 are False)	Branch A: False Branch D: False Branch I: False Branch M: False Branch N: False

			Condition M is False Condition N is False Condition O is False Condition P is False Condition Q is False Condition R is False Condition S is False Condition T is False Condition U is True **21/30 + 1/30 = 22/30**	Branch O: False Branch P: False Branch Q: False Branch R: False Branch S: False Branch T: False Branch U: True **17/26 + 1/26 = 18/26**
4	homework: [0.55,0.55,0.55] labs: [0.55,0.55,0.55] midterm: 0.55 final: 0.55	“D+”/3	Condition A is False Condition D is False (Conditions I1, I2, I3 are False) Condition M is False Condition N is False Condition O is False Condition P is False Condition Q is False Condition R is False Condition S is False Condition T is True **22/30 + 1/30 = 23/30**	Branch A: False Branch D: False Branch I: False Branch M: False Branch N: False Branch O: False Branch P: False Branch Q: False Branch R: False Branch S: False Branch T: True **18/26 + 1/26 = 19/26**
5	homework: [0.6,0.6,0.6] labs: [0.6,0.6,0.6]	“C”/4	Condition A is False Condition D is False	Branch A: False Branch D: False Branch I: False Branch M:

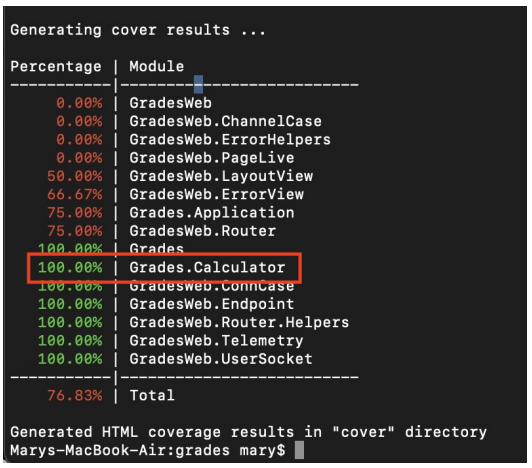
	midterm: 0.6 final: 0.6		(Conditions I1, I2, I3 are False) Condition M is False Condition N is False Condition O is False Condition P is False Condition Q is False Condition R is False Condition S is True **23/30 + 1/30 = 24/30**	False Branch N: False Branch O: False Branch P: False Branch Q: False Branch R: False Branch S: True **19/26 + 1/26 = 20/26**
6	homework: [0.65,0.65,0.65] labs: [0.65,0.65,0.65] midterm: 0.65 final: 0.65	“C+”/5	Condition A is False Condition D is False (Conditions I1, I2, I3 are False) Condition M is False Condition N is False Condition O is False Condition P is False Condition Q is False Condition R is True **24/30 + 1/30 = 25/30**	Branch A: False Branch D: False Branch I: False Branch M: False Branch N: False Branch O: False Branch P: False Branch Q: False Branch R: True **20/26 + 1/26 = 21/26**
7	homework: [0.7,0.7,0.7] labs: [0.7,0.7,0.7] midterm: 0.7 final: 0.7	“B”/6	Condition A is False Condition D is False (Conditions I1, I2, I3 are False) Condition M is False	Branch A: False Branch D: False Branch I: False Branch M: False Branch N: False Branch O: False Branch P: False

			Condition N is False Condition O is False Condition P is False Condition Q is True **25/30 + 1/30 = 26/30**	Branch Q: True **21/26 + 1/26 = 22/26**
8	homework: [0.75,0.75,0.75] labs: [0.75,0.75,0.75] midterm: 0.75 final: 0.75	“B+”/7	Condition A is False Condition D is False (Conditions I1, I2, I3 are False) Condition M is False Condition N is False Condition O is False Condition P is True **26/30 + 1/30 = 27/30**	Branch A: False Branch D: False Branch I: False Branch M: False Branch N: False Branch O: False Branch P: True **22/26 + 1/26 = 23/26**
9	homework: [0.8,0.8,0.8] labs: [0.8,0.8,0.8] midterm: 0.8 final: 0.8	“A-”/8	Condition A is False Condition D is False (Conditions I1, I2, I3 are False) Condition M is False Condition N is False Condition O is True **27/30 + 1/30 = 28/30**	Branch A: False Branch D: False Branch I: False Branch M: False Branch N: False Branch O: True **23/26 + 1/26 = 24/26**
10	homework: [0.85,0.85,0.85]	“A”/9	Condition A is False	Branch A: False Branch D: False

	labs: [0.85,0.85,0.85] midterm: 0.85 final: 0.85		Condition D is False (Conditions I1, I2, I3 are False) Condition M is False Condition N is True **28/30 + 1/30 = 29/30**	Branch I: False Branch M: False Branch N: True **24/26 + 1/26 = 25/26**
11	homework: [0.9,0.9,0.9] labs: [0.9,0.9,0.9] midterm: 0.9 final: 0.9	“A+”/10	Condition A is False Condition D is False (Conditions I1, I2, I3 are False) Condition M is True **29/30 + 1/30 = 30/30**	Branch A: False Branch D: False Branch I: False Branch M: True **25/26 + 1/26 = 26/26**
			100% 30/30	**100% 26/26**

Question 1.4: Coverage

- Nous avons atteint un couverage de 100% pour le statement, ce que nous avons vérifier avec la commande mix test --cover, comme cette vérification est primitif et ne permet pas de vérifier la couverture de branche, nous avons verifier la couverture de branche manuellemt à l’aide des graphes de flot de contrôle.
- La couverture de déclaration nous donne essentiellement le pourcentage d'instructions exécutées.
- Nous pouvons toujours obtenir une couverture complète des déclarations sans passer par toutes les branches.
- La couverture des branches implique la couverture des déclarations dans notre cas, car chaque déclaration « si » a un « sinon », ce qui signifie que nous parcourons automatiquement toutes les déclarations lorsque nous couvrons toutes les branches.
- La couverture au niveau de la déclaration n'est certainement pas suffisante, pour les applications majeures et les logiciels complexes, un outil de test devrait fournir plus d'options en matière de test de couverture.



Exercice 2: Réfraction du code

Question 2.1:

```elixir
# Question 2.1
  def avg(homework, labs) do
    avg_homework =
      if Enum.count(homework) == 0 do
        0
      else
        Enum.sum(homework) / Enum.count(homework)
    end

    avg_labs =
      if Enum.count(labs) == 0 do
        0
      else
        Enum.sum(labs) / Enum.count(labs)
    end
    {avg_homework, avg_labs}
  end
```

Question 2.2:

```elixir
# Question 2.2
  def failed_to_participate(avg_homework, avg_exams, num_labs) do
    avg_homework < 0.4 || avg_exams < 0.4 || num_labs < 3
  end
```

Question 2.3:

```
# Question 2.3
  def calculate_grade(avg_labs, avg_homework, midterm, final) do
    0.2 * avg_labs + 0.3 * avg_homework + 0.2 * midterm + 0.3 * final
  end
```

Question 2.4: Les deux réfractions de code additionnels

```
# Question 2.4.1
def letter(mark)do
cond do
        mark > 0.895 -> "A+"
        mark > 0.845 -> "A"
        mark > 0.795 -> "A-"
        mark > 0.745 -> "B+"
        mark > 0.695 -> "B"
        mark > 0.645 -> "C+"
        mark > 0.595 -> "C"
        mark > 0.545 -> "D+"
        mark > 0.495 -> "D"
        mark > 0.395 -> "E"
        :else -> "F"
      end
end


# Question 2.4.2
  def number(mark) do
  cond do
        mark > 0.895 -> 10
        mark > 0.845 -> 9
        mark > 0.795 -> 8
        mark > 0.745 -> 7
        mark > 0.695 -> 6
        mark > 0.645 -> 5
        mark > 0.595 -> 4
        mark > 0.545 -> 3
        mark > 0.495 -> 2
        mark > 0.395 -> 1
        :else -> 0
      end
  end
```