

### **Q9. Food Preparation Arrangement (50 marks):**

Catherine's restaurant is selling burger, pizza, and mee in Kampar, Perak. The restaurant starts to provide take-away service at 10:00 every morning during the period of Movement Control Order (MCO). There are three chefs responsible for preparing food for customers, and the preparation time of each pack of food is 5 minutes.

When the restaurant starts to operate, normally there have already been 1~5 customers waiting to order their food. Catherine will assign chefs to serve these customers with the following criteria.

1. Customers are served in a first-come-first-serve basis, in accordance with their sequence in the queue.
2. When a customer is being served, the same type of food will be prepared by the same chef regardless of the quantity of the food being ordered. For example, if the customer order 3 packs of pizza, then only 1 chef is assigned to prepare the pizza.
3. Different types of food ordered by the same customer can be prepared by the same or different chefs, with the principle that all chefs should be kept as equally busy as possible.
4. Since waiting time is an important determinant in restaurant business, Catherine will assign chefs, with the above criteria, to serve each customer so that he/she can collect his/her food as soon as possible.

To handle orders from customers, Catherine has a computer system which can read the orders from multiple customers with the following format. Note that it is a line of characters/numbers and there is no space between any two adjacent characters/numbers.

```
[Customer1]#[Food11]:[QuantityOfFood11]#[Food12]:[QuantityOfFood12]#[Food13]:[QuantityOfFood13];[Customer2]#[Food21]:[QuantityOfFood21]#[Food22]:[QuantityOfFood22]...
```

where the following symbols are used for

# for separating between a customer and his/her order

% for separating between different food types ordered by the same customer

: for separating between ordered food type and its quantity

; for separating between different customers.

For example, if the input string is

```
John#burger:2%pizza:1%mee:1;Mary#burger:1;Sam#pizza:3%burger:5
```

That means John orders 2 burgers, 1 pizza, and 1 mee;

Mary orders 1 burger;

Sam orders 3 pizzas, and 5 burgers.

The computer system will then output the following messages for Catherine to monitor the operational progress:

```
[Customer1] can collect food at [Time1]
```

```
[Customer2] can collect food at [Time2]
```

...

where the format of Time is Hour:Minute in 24-hour mode.

For example, with the input given in the above example, the output will be

John can collect food at 10:10

Mary can collect food at 10:10

Sam can collect food at 10:30

**Write a programme to**

**Input** a string with the above format. Assume that at most 5 customers are waiting in the queue before the restaurant starts operation at 10:00, and the total quantity of food ordered by each customer is no more than 20.

**Output, based on the customers' sequence in the queue,** the time each customer can collect food with the format of "[Customer] can collect food at [Time]". Please note that for each test case, the business start time of the restaurant is fixed at 10:00.

### 试题 9. 食物准备的安排 (50 marks) :

凯瑟琳在霹雳金宝拥有一间售卖汉堡包 (burger), 比萨饼 (pizza), 以及炒面 (mee) 的餐厅。在行管令期间, 由于不准堂食, 凯瑟琳的餐厅每天早上 10:00am 开始提供外卖服务。餐厅里有三名厨师为顾客准备食物, 而每一道食物的准备时间都刚好是 5 分钟。

当餐厅开始营业时, 通常在外已有 1 至 5 位顾客等待下单。然后凯瑟琳会根据以下的作业准则分配厨师为顾客准备食物

1. 按照顾客在队列中的顺序, 以先到先服务的方式为他们准备食物。
2. 为一位顾客准备食物时, 若是同类食物, 无论点的数量多少, 均由同一位厨师负责烹制。例如, 如果一位顾客订购 3 个比萨饼, 则只有 1 名厨师会被分配准备这些比萨饼。
3. 同一位顾客点的不同种类的食物, 则可以由同一个或不同的厨师准备, 原则是尽可能让所有的厨师同样的忙碌。
4. 由于等候时间是餐饮业的重要指标, 凯瑟琳会根据上述标准指派厨师为每一位顾客服务, 以让顾客能尽快领取食物。

为了处理来自顾客的订单, 凯瑟琳购置了一个电脑系统, 以读取来自多个顾客的订单。请注意: 订单是一行字符数字, 两个字符数字之间无空格, 其格式如下所示:

```
[顾客 1]#[食物 11]:[食物数量 11]%[食物 12]:[食物数量 12]%[食物 13]:[食物数量 13];  
[顾客 2]#[食物 21]:[食物数量 21]%[食物 22]:[食物数量 22] ...
```

其中以下符号用于

# 用以区隔顾客以及他/她的订单

% 用以区隔同一顾客订购的两种食物

: 用以区隔同一顾客订购某种食物以及此食物的数量

; 用以区隔两位不同的顾客

例如, 若输入的字符串为:

```
John#burger:2%pizza:1%mee:1;Mary#burger:1;Sam#pizza:3%burger:5
```

这就表示 John 订购了 2 burgers, 1 pizza, 以及 1 mee;

Mary 订购了 1 burger;

Sam 订购了 3 pizzas, 以及 5 burgers.

然后电脑系统会输出以下讯息让凯瑟琳监察餐厅运作进度:

```
[顾客 1] can collect food at [时间 1]
```

```
[顾客 2] can collect food at [时间 2]
```

```
...
```

其中时间的格式为 24 小时制的 几点:几分。

例如，对于上例中给出的输入，输出将是

John can collect food at 10:10

Mary can collect food at 10:10

Sam can collect food at 10:30

### 试写一程式以

**输入** 一个符合上述规格的字符串。假设餐厅在 10:00 开始营业，并且此前最多有 5 位顾客在排队等候，而每个顾客点的食物总量不超过 20。

**根据顾客在队列中的顺序，依序输出**每个顾客可以领取食物的时间，格式为“[顾客] can collect food at [时间]”。请注意，对于每个测试用例，餐厅的营业开始时间固定为 10:00。

### Example (例子)

Input (输入)	Output (输出)
Ali#burger:1%pizza:2% mee:3	Ali can collect food at 10:15
John#burger:2%pizza:1% mee:1;Mary#burger:1;Sam#pizza:3%burger:5	John can collect food at 10:10 Mary can collect food at 10:10 Sam can collect food at 10:30
Christine#burger:12%pizza:2% mee:3;Phantom#burger:1% mee:6;Raoul#pizza:1%burger:1	Christine can collect food at 11:00 Phantom can collect food at 10:40 Rauol can collect food at 10:30
Aminah#pizza:20;Seng#pizza:20;Summi#pizza:20;Ben#mee:20;Alex#pizza:10% mee:10	Aminah can collect food at 11:40 Seng can collect food at 11:40 Summi can collect food at 11:40 Ben can collect food at 13:20 Alex can collect food at 12:30
Muthu#burger:3%pizza:2% mee:1;Barani#burger:5% mee:2;Sammy#pizza:6;Firdaus#mee:2%pizza:3#;Chong#burger:1%pizza:1	Muthu can collect food at 10:15 Barani can collect food at 10:30 Sammy can collect food at 10:45 Firdaus can collect food at 10:40 Chong can collect food at 10:45