Université Pierre et Marie Curie

Modelisation Objet

TME3 – Conteneurs & Itérateurs

Auteur:
William Fabre

Professeur:
Madame Marie-Minerve Louerat

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Question 1 : Écrire une fonction backInsert()

1.1   Charger dans un vecteur de string le texte en insérant les nouveaux éléments à la fin.

Pour se faire il faut declarer un vector¡std::string¿ et parcourir notre string qui est dans GPL_2_text.h. On va ajouter tous les mots avec la fonction push back des vectors.

1.2   Afficher le nombre d'éléments du vecteur.

pour afficher tous les elements j'ai declarer une fonction sous forme de template pour la reutiliser dans le maximum de cas possibles

```
template<typename T>
void show(T gpl);
```

Cette fonction affiche la size(returns the number of elements) et la max size(returns the maximum possible number of elements) puis affiche sur une seule ligne toutes les string contenue dans la structure contenant les strings. Cette fonction peut donc marcher pour les vectors et les lists mais pas les map. J'utilise aussi la fonction capacity(returns the number of elements that can be held in currently allocated storage)

1.3   Trier les éléments du vecteur.

Pour trier tous les elements du vecteur on va utiliser le template std::sort. Les elements sont compare en utilisant operator¡ deja implemente pour les vectors, lists et map. On utilise donc pas d'operateur de comparaison particulier et le protocol reste sequentiel car on ne fait pas de parallelisation. On precise donc juste le begin et le end.

1.4   Afficher tous les éléments du vecteur. On les affichera sur une seule ligne (ce sera très long).

la fonction show fait l'afficache en parcourant la structure de donnee contenant directement des strings grace a un iterateur sous forme de foreach. Cela fonctionnera pour les lists et les vectors.

1.5   Calcule de temps

le temps pour back_insert() est :

```
backInsert tt: 0.5 secondes ecoulees
```

La structure est faite sous forme de tableau et va donc inserer en fin de vector a la premiere place libre. Il possede deja un pointeur sur la premiere case libre et n'a donc pas besoin de parcours. L'insertion est en O(1) et on a donc un temps assez court modulo l'affichage et le remplissage complet du vector avec les doublons.

Question 2 : Écrire une fonction frontInsert() identique à la précédente

Pour se faire on va utiliser:

```
iterator insert( iterator pos, const T& value );
```

Cette fonction est utilisable par les vectors et va permettre de preciser qu'on doit inserer dans vector.begin().

le temps est de :

```
frontInsert tt: 0.94 secondes ecoulees
```

plus long car on est oblige de revenir au debut a chaque fois et il est oblige de deplacer tous les elements suivant dans le vecteurs ce qui n'est pas efficace.

Question 3: Écrire une fonction sortEachInsert()

Le temps est de :

```
backInsert && Sort each tt: 3.656 secondes ecoulees
```

On est ici sur un temps beaucoup plus long car le rangement du vecteur va se faire a chaque insertion est il faut pour ranger un vecteur au mieux O(nlog(n)). cf reference : "O(N·log(N)), where N = std::distance(first, last) comparisons on average. (until C++11)"

Question 4 : Le conteneur List

Voici l'affichage dans le terminal pour les differentes fonctions.

```
backInsert tt: 0.4 secondes ecoulees
frontInsert tt: 0.4 secondes ecoulees
frontInsert && sort each tt: 2.308 secondes ecoulees
```

Le back insert ne pose pas de probleme dans une liste doublement chainee car on possede un iterateur dans les deux sens de la liste. On peut donc inserer en tete et en queue en O(1). Avec les fonctions : push_front (inserts an element to the beginning) et push_back (adds an element to the end). Ici on utilise push et pas emplace car ce sont des elements simple et on cherche juste a faire une copie d'un element dans notre vecteur. cf : "if you want to add a copy of an existing instance of the class to the container, use push. If you want to create a new instance of the class, from scratch, use emplace." https://stackoverflow.com/questions/26198350/c-stacks-push-vs-emplace/26198609

Question 5 : Le conteneur map

5.1   Chercher si un élément ayant pour clé le mot existe.

Pour savoir si un mot existe on va utiliser la fonction finds et non pas la fonction contains. Elles possedent apparemment la meme complexite algorithmique mais la fonction finds va nous renvoyer un iterateur s'il trouve un element correspondant a la clee recherchee. On va pouvoir verifier si cet iterateur est juste apres le dernier element car finds va fouiller tout jusqu'au dernier element. La complexite est Logarithmiquepar rapport a la taille de la map. Si on est apres la fin alors on n'a rien trouve sinon on a trouve un element donc on incremente le champ valeur. Dans l'autre cas on ajoute un nouvel element avec la fonction insert. en declarant un objet pair.

5.2   Afficher le nombre d'éléments

De maniere plus complexe on peut creer une structure qui tient a jour le nombre d'element mais je me suis contente de faire un parcours de tous les elements avec une variable accumulatrice.

`Total number of words :2981`

5.3   Afficher l'ensemble des éléments de la map

Map TB

0 02110 1 10 11 12 1301 1989 1991 2 3 4 5 51 6 69 7 8 9 A ABOVE ABSOLUTELY ADVISED AGREED ALL AND ANY APPLICABLE ARISING AS ASSUME Accompany Activities Also And Any Apply April BE BECAUSE BEEN BEING BUT BY Boston But By C CHARGE CONDITIONS CONSE-QUENTIAL COPYING COPYRIGHT CORRECTION COST Coon Copyright DAMAGES DATA DEFECTIVE DISTRIBUTION EITHER END ENTIRE EVEN EVENT EXCEPT EXPRESSED EXTENT Each Everyone Exception FAILURE FITNESS FOR FREE Fifth Finally Floor For Foun-dation Foundations Franklin Free GENERAL GNU General Gnomovision HAS HOLDER HOLDERS Hacker Here Hereinafter How However IF IMPLIED IN INABILITY INACCURATE INCIDENTAL INCLUDING IS ISWITHOUT If In Inc It James June KIND LAW LIABLE LICENSE LICENSED LIMITED LOSS LOSSES Lesser License Licenses MA MAY MERCHANTABILITY MODIFICA-TION MODIFY Many NECESSARY NO NOT New OF OPERATE OR OTHER OTHERWISE OUT Of Our PARTICULAR PARTIES PARTY PERFORMANCE PERMITTED POSSIBILITY PROGRAM PROGRAMS PROVE PROVIDE PUBLIC PURPOSE Preamble President Program Programs Public QUALITY REDISTRIBUTE RENDERED REPAIR REQUIRED RISK SERVIC-ING SHOULD SPECIAL STATED SUCH SUSTAINED Section Sections See Software Some Street

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map test : 0.4 secondes ecoulees

Question 6 : Fonction de Tri, Objet Fonctionnel

6.1   Odre inverse des lettres dans le mot

Pour creer cette fonction on va declarer une struct dans laquelle on va faire un overload sur la fonction operator(). Je reverse les deux strings grace a la fonction reverse avec le begin et le end de chaque string. On peut desormais renvoyer le lexicographic_compare entre les deux strings en prenant le begin et le end des deux strings inversees. On voit bien que les strings sont rangees dans l'ordre inverse des lettres.

On tombe sur ce resulstat :

Map TB

Total number of words :2981

0 10 02110 1 1301 11 51 1991 2 12 3 4 5 6 7 8 9 69 1989 A MA USA DATA C PUBLIC AGREED IMPLIED SUSTAINED RENDERED REQUIRED ADVISED LICENSED EXPRESSED STATED LIMITED PERMITTED SHOULD AND END KIND THIRD BE PERFORMANCE PROVIDE FREE CHARGE THE APPLICABLE LIABLE ASSUME THERE ENTIRE FAILURE OTHER-WISE LICENSE PURPOSE USE BECAUSE OPERATE INACCURATE REDISTRIBUTE DEFEC-TIVE ABOVE PROVE IF OF SERVICING INCLUDING BEING ARISING WRITING COPYING SUCH WITH RISK SPECIAL CONSEQUENTIAL GENERAL INCIDENTAL ALL WILL PRO-GRAM BEEN WHEN EVEN IN MODIFICATION CORRECTION DISTRIBUTION WHO NO TO PARTICULAR HOLDER EITHER OTHER REPAIR OR FOR AS HAS DAMAGES WARRANTIES PARTIES LOSSES IS PROGRAMS TERMS CONDITIONS HOLDERS UNLESS FITNESS LOSS COPYRIGHT EXTENT EVENT NOT EXCEPT COST BUT OUT WITHOUT ISWITHOUT GNU YOU LAW MAY BY MODIFY ABSOLUTELY ANY NECESSARY QUALITY INABILITY MER-CHANTABILITY POSSIBILITY WARRANTY PARTY a idea b c Public public electronic Inc instead add placed introduced guided provided intended included excluded need changed published modified implied called compelled threatened signed designed considered covered required preferred based re-vised licensed imposed passed addressed used associated translated designated terminated restricted copyrighted prohibited limited granted implemented started permitted distributed believed received derived allowed forbid valid invalid void avoid held could should would And and extend found third accord We be interface place Vice choice price notice service reliance compliance balance acceptance circumstance absence consequence since source induce made decide outside provide wide code mode include See fee Free free three licensee guarantee storage language change interchange exchange range infringe charge he The she the make take like readable unenforceable identifiable executable responsi-ble possible Preamble file whole sole sample example people name same time Some welcome volume machine line copyrightline subroutine one someone anyone Everyone everyone June Yoyodyne scope hope type are share Software software Here there where mere entire Therefore more sure signature case These these precise exercise otherwise else License license sublicense those whose choose impose

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6.2   Odre lexicographique inverse

Pour l'ordre lexicographique inverse on utilise une class CompareString2 et on defini dans l'espace public une fonction pour creer un foncteur.

```
bool operator() (string v1, string v2){
    return v1 > v2;
}
```

Et on arrive sur l'ordre lexicographique inverse. il faut faire attention car les comparaisons de string se font avec un boolean mais la comparaison qui est utilisee pour comparer des lettres est en ternaire, 0, ¿ 0, ¡ 0 (voir compare String cpp reference).

Total number of words :2981 your you years year wrote written write would works work without with wish willing will wide whose whole who which whether where when whatever what welcome we way warranty want w volume void view versions version verbatim validity valid using users user useful used use up unless unenforceable understands under type two true translation translated translate transferring too to time thus through three threatened though those thoroughly this third things they these thereof there then themselves them their the that than terms terminated terminate term telling take system surrender sure suits such subroutine sublicense subject storage steps status stating starts started start spirit specify specifies special speak source sometimes something someone sole software so since simultaneously similar signed signature sign show should short she sharing share service separate sections section scripts scope school saying say satisfy sample same safest runs running run royalty rights right revised reuse restrictions restricted rest responsible responsibilities requirements required reputations remain reliance regardless refrain reflect refers referring refer redistributors redistribution redistribute recipients recipient receives received receive reasonably reason reads readable rather range purpose published publish public provided provide protection protecting protect proprietary property promoting prominent prohibited programs programmer program problems print price prevent preserving present preferred precise practices possible portion pointer plus places placed place pieces physically physical pertinent permitted permit permissions permission performing people patents patent passes passed party parts parties particular part paper outside output ours our otherwise others other original ordinary order or option operating only one on offering offer of obtain obligations object number notices notice nothing not normally noncommercial no new need necessary names name must mouse most more modules modifying modify modified modifications modification mode mere menu meet medium means may making makes make major mail made machine long linking line limited limitation like licensor licenses licensees licensee licensed license library legal least law later language know kernel keep judgment itself its items it issues is invalid introduced into interfaces interface interest interchange interactively interactive intent intended integrity intact instead installation infringement infringe information induce individually indirectly indicate independent incorporating incorporates incorporate including included include in imposed impose implied implemented if identifiable idea hypothetical how hope holder herein hereby held he having have has guided guarantee greatest gratis grants granted goals gives given give get geographical generous generally further full from freedom free found forming form forbid for following follow files file fee extend expressly explicit exercise executable excuse exclusion excluding excluded exchange exceptions exception except example everyones everyone every ever even equivalent entirely entire enforcing employer else electronic either effectively effect each donor does document do distribution distributing distributed distribute distinguishing display disclaims disclaimerfor disclaimer directly different differ develop details detail designed designated derived derivatives derivative depends deny definition decision decide date danger customarily covered court course counts countries could cost corresponding copyrightline copyrighted copyright copying copy copies convey control contributions contrast contradict contest contents contains containing contact constitute constantly conspicuously consistent considered consider consequence conditions concerns components component compliance complete compilers compiler compilation compelled commit commands comes collective code clicks clear claims claim circumstances circumstance choose choice charge changing changed change certain cause case carry cannot can called c by but bring brief both body binary best below believed been be based balance b away avoid automatically authors author attempt attach at associated ask as are appropriately appropriate apply applies applications application anything anyone any another announcement and an among alternative alter also along allowed allegation all agreement aggregation addressed address addition add actions act achieve accord accompanies access acceptance accept absence above a Yoyodyne Your You YOU Whether When We WRITING WITHOUT WITH WILL WHO WHEN WARRANTY WARRANTIES Vice Version USE USA UNLESS Ty To Thus This These Therefore The Terms TO THIRD THERE THE TERMS Such Subsection Street Some Software See Sections Section SUSTAINED SUCH STATED SPECIAL SHOULD SERVICING RISK REQUIRED

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