

110 學年度第一學期 演算法 第四次作業

1. Problem: **Dictionary**

利用 Binary Search Tree (BST), Treap (TH), 2-3 Tree (23T) and **Hashing** 分別建構一 Dictionary，並且利用該 Dictionary 做 Searching 以及其時間分析。

Functions:

- i. Build **BST**, **TH**, **23T**, and **Hashing** with a Text File Input `test.txt`
 - a. 定義 Token & Words in Dictionary
 - b. 定義 **BST**, **ST**, **23T**, and **Hashing** (實作課本 295 頁(ppt 的 57-58 頁)的兩個 Hash functions, 討論不同 Hash Table Sizes, Collision 等問題)
- ii. Searching with an input test file, part of the Text File `test.txt`
- v. Search a word (Input from file or keyboard)
- iii. Add a word (Input from file or keyboard)
- iv. Delete a word (Input from file or keyboard)

2. 繳交檔案分別為

- i. Dictionary_Report_學號.doc (完整報告)
- ii. Dictionary_Prog_學號.c (Dictionary 程式 c, c++ 等)
- iii. Dictionary_Prog_學號.exe (Dictionary 執行檔)
- iv. TestFile1.txt & TestFile11.txt, TestFile12.txt, ... (Test 1 set)
- v. TestFile2.txt& TestFile21.txt, TestFile22.txt, ... (Test 2 set), ...

3. 報告內容完整性：

- i. 簡介及問題描述
 - ii. 理論分析
 - iii. 演算法則
 - iv. 程式設計語言、工具、環境與電腦硬體等規格說明
 - v. 程式 (含 source code, test files)
 - vi. 執行結果與討論 (功能討論、執行效率、**BST**, **TH**, **23T**, **Hashing** 應用等討論)
- ☐ 完整報告與程式(source code, test files, and executable code)經壓縮後(RAR or ZIP)，依規定時間內上傳至教學網站。

4. 作業繳交日期：**110/12/28 晚上 23:59 前** (上傳至教學網站, It is hard deadline)

**110/12/29(星期三下午 2:30-4:00 & 晚上 6:00-7:15)助教上機驗收，未
到者該題作業 0 分計算，驗收地點：ZA307-1**

5. 遲交以 0 分計算，除特殊情況。

6. 下兩頁為一輸入的範例，同學可自行上網找英文文章範例。繳交作業時，務必上傳至少兩組的測試範例組(每一組須包含一字典檔案&三個搜尋檔案範例)。

Input Files: (for examples)

TestFile1.txt (建構字典的輸入檔)

// in web site <http://m.mlb.com/news/article/208585722/mlb-waiting-for-posting-of-shohei-oh-tani/>

Japanese 2-way player Ohtani could shake up market

MLB waiting to see if righty/DH will be posted this year by Nippon-Ham Fighters

SCOTTSDALE, Ariz. -- Over the course of the next week we will see the game's best and brightest being feted with Cy Youngs and MVPs, among other major trophies. But one name you won't hear announced on any of these awards shows is arguably the most dynamic baseball talent in the world.

Shohei Ohtani just led the Nippon Ham Fighters to the Japan Series title and this came on the heels of a season in which the 22-year-old pitcher/DH (you read that right) posted a 1.86 ERA while slugging 22 homers with a league-high 1.004 OPS and getting Major League general managers dreaming of the possibilities. So now the question is: When will we see him in MLB?

"He'd be by far the best pitcher on the market" this offseason, said one GM who, like the others consulted, spoke on the condition of anonymity because Ohtani is still under contract with his Japanese club.

- Hot Stove Tracker: Free agents and trades

Ohtani would be the best pitcher to come over from Japan since Masahiro Tanaka signed with the Yankees in 2014 and, before that, Yu Darvish, who was 26 when he joined the Rangers in '12 following seven seasons in Japan. Darvish also pitched for the Fighters, who defeated the Hiroshima Carp in a six-game title series last month.

But there's an added bonus with Ohtani. He's an excellent hitter who serves as the Fighters' designated hitter three games a week in between starts.

Will Ohtani join MLB as a pitcher, a hitter or both?

"It's something I don't have any control of," Ohtani said earlier this year when the Fighters were in Arizona for two weeks for Spring Training. "It's something the team that wants me picks. If they want me as a pitcher, I'll go as a pitcher. If they want me as a hitter, I'll go as a hitter. It's really not up to me."

But take a look at this past season's numbers: Ohtani, as a right-handed pitcher who throws in the high 90s and regularly reaches 100 mph, was 10-4 with a league-best 1.86 ERA and 174 strikeouts in 140 innings. As a left-handed hitter, he had a slash line of .322/.416/.588 with 22 homers, 67 RBIs and a 1.004 OPS (high enough to lead the league, but he fell short of the minimum to qualify with 382 plate appearances).

Ohtani used to play the outfield, too, but the Fighters stopped that practice after he injured a calf muscle and missed part of the 2015 season.

In the Majors, there hasn't been a true two-way player in the DH era. More than a century ago, Babe Ruth played some outfield on the days he didn't pitch for the Red Sox, appearing in 225 games as an offensive player in 1918-19, when he also pitched in 37 games. The Yankees shut him down as a pitcher after they got him from Boston in time for the 1920 season.

Would a Major League team also let Ohtani hit in games in which he doesn't pitch?

"Sign me up," said another MLB GM. "I think every one of the 30 teams would be in the mix."

Here's the challenge for Ohtani: Under Nippon Professional Baseball rules, he is a four-year player who won't be available internationally as an unrestricted free agent until after his ninth season. So the only way he can join MLB before then is if the Fighters post him under the latest rules for the maximum fee of \$20 million. They can do so anytime between now and when the Japan Leagues begin Spring Training in early February.

But the sooner the better, MLB GMs mused, before they spend all their offseason money. If the Fighters do post Ohtani, every Major League team would have a shot at signing him. The one that does would pay the fee.

The posting system used to make it a lot more lucrative for Japanese teams. MLB clubs that wanted to compete for the services of a Japanese player sent a blind bid to Major League Baseball. In 2007, the Red Sox won the sole rights to talk to pitcher Daisuke Matsuzaka with a high bid of \$51.11 million. They signed the right-hander to a six-year deal worth \$52 million.

To make it more competitive for MLB teams, the posting system was changed in December 2013, just in time for the arrival of Tanaka, who had finished a 24-0 season with a 1.27 ERA for the Rakuten Golden Eagles. Tanaka toured the U.S. and the Yankees prevailed, signing the right-hander to a seven-year, \$155 million contract.

The Eagles received the maximum \$20 million fee.

That kind of money could help a team sign a lot of players in Japan, and the Fighters now have to decide whether Ohtani is at his maximum value in a year when Rich Hill, Jeremy Hellickson and Jason Hammel are the best starting

pitchers on MLB's free-agent market.

A few MLB GMs don't think Ohtani will be posted until 2018, though a report on Wednesday in the New York Post said that next offseason is the target and he could fetch more than \$200 million.

If you're Ohtani, though, you'd probably want to get over here as soon as possible just for the payday. Hiroki Kuroda, finishing his stellar career that traversed Japan and the U.S., was the highest-paid player in Japan this past season at \$4.9 million. Ohtani earned \$1.83 million.

But there are other considerations, like hitting. As a teenager, Ohtani asked the NPB teams not to draft him so he could immediately sign in the U.S. The Fighters told him he could be a two-way player, and that changed his mind.

They were able to do so because in Japan, like MLB, the Pacific League -- which the Fighters play in -- utilizes the DH. Similarly, in the U.S., National League teams, sans the DH, would be at a disadvantage trying to sign Ohtani. The pool would further be culled by weeding out American League teams that don't want Ohtani to DH on the days he's not pitching.

At least one GM said his team would agree Ohtani can do both, shattering all precedence. And Ohtani will make big money.

It's up to the Fighters to post him, and 30 MLB teams are waiting on that decision.

TestFile11.txt (輸入到字典查詢的範例檔案 1，需分析查詢的時間、成功率與失敗率等)

Ohtani would be the best pitcher to come over from Japan since Masahiro Tanaka signed with the Yankees in 2014 and, before that, Yu Darvish, who was 26 when he joined the Rangers in '12 following seven seasons in Japan. Darvish also pitched for the Fighters, who defeated the Hiroshima Carp in a six-game title series last month.

TestFile12.txt (輸入到字典查詢的範例檔案 2，需分析查詢的時間、成功率與失敗率等)

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TestFile13.txt (輸入到字典查詢的範例檔案 3，需分析查詢的時間、成功率與失敗率等)

Ohtani is the best pitcher to come out of Nippon Professional Baseball since Yu Darvish—perhaps even better—in addition to being one of the best hitters in NPB. Ohtani is a two-way star who's proved himself against the toughest competition baseball has to offer outside of MLB, and while he wants to play both ways and would likely make the opportunity to do so part of his decision-making calculus, he's a potential no. 1 starter. Players this good just don't make it to free agency anymore, and they definitely don't make it to free agency at age 23. With his skill, versatility, and age, Ohtani might be the most valuable unattached baseball player since Alex Rodriguez's first free agent go-around after the 2000 season.