

Address Conversion Tool v1.0 usage guide

System Requirements

The Address Conversion Tool has been tested with the following configuration:

- J2SE 1.4.2 (require Java 1.4 or above)
- Windows XP (the Address Conversion Tool is platform independent)
- HKSCS-2001 (optional)

What is Address Conversion Tool

The Address Conversion Tool helps to convert free-format address from one dimension to another. The tool is written in JAVA and can handle both Traditional Chinese and English address conversion.

The tool converts addresses by using simple decision rules, which will be covered in the later section.

The tool will try to tokenize the address into components (such as flat, floor, building, street, etc) and will manipulate the component as a whole. For example, if the input address is longer than the column dimension of the output format, the tool will try to break address into 2 rows in the component boundary (i.e. it will break “YUEN LONG NEW TERRITORIES” into rows “YUEN LONG” and “NEW TERRITORIES”).

Changes Highlights

Changes in version 1.0

- Better handling of Chinese addresses (include new patterns and keywords)
- Group “xxx-xxx” and “xxx & xxx” together (e.g. the tool will try not to break “124-128 & 132-136 Wo Yi Hop Road”)
- Add new keywords for street
- Add “Offices” as building keywords (for cases like “Mongkok Government Offices”)

Changes in version 0.1c

- Add “SUITE” into ROOM/FLAT keyword list
- Better handling of keyword “TOWER”

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How to Use the Address Conversion Tool

The tool is packaged into 1 single JAR file. A simple test program (TextFileAddressTester.java) is included demonstrating how to use the Address Conversion Tool.

The conversion tool converts address one at a time. To convert a source address into a specific output dimension, simply perform the following steps:

1. Construct a FreeTextAddressConvertor object with the source address and output dimension as parameters. Where source address is an array of address lines, output dimension is an array of integer telling the output dimension. The following example will try to convert source address having columns "BLOCK A FUK LAI GARDEN", "FUK HING TSUEN" into dimension of 3x30:

```
String[] source = {"BLOCK A FUK LAI GARDEN", "FUK HING TSUEN"};
int[] outputDimension = {30,30,30};
FreeTextAddressConvertor convertor;
convertor = new FreeTextAddressConvertor(source, outputDimension);
```

2. Execute convertor.convert() and get the converted address.

```
String[] destination = convertor.convert();
```

3. ConvertAddressException may rise if the source address is too long to fit into the output dimension or unknown exception encountered (this should be very rare).

How to Use the Sample Test Program

A sample test program is included in the tool. To run the test program, simply execute the following command (JAVA 1.4 or above is required).

```
java -cp .;addressConvertor.jar TextFileAddressTester InputFile OutputFile
```

When Converting Address into Dimension 35,35,35,60

The 1st line contains the number of lines of the output dimension, followed by column dimension of each line. Each address block should be separated by a blank line.

The following shows sample source file converting 2 address blocks into dimension 35,35,35,60.

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4
35
35
35
60

source address block A line 1....

source address block A line 2....

source address block B line 1....

source address block B line 2....

Key technology used in the Address Conversion Tool

The conversion tool makes use of the following technology:

Technology	Description
JAVA v1.4	JAVA is used because of it is platform independent. Although some technology in JAVA 1.4 is used (see JAVA BreakIterator), the tool can still be implemented by using different programming language.
JAVA BreakIterator	<p>The JAVA BreakIterator class implements methods for finding the location of word boundaries in text. It separates English words by using space, hyphen, etc. It can also separates Chinese characters no matter space is present or not.</p> <p>The JAVA BreakIterator is the base for tokenizing words. The address is first broken into words (English word or Traditional Chinese character). The words will then form token by using fuzzy logic (see Tokenization section).</p>
Rule based engine	<p>The conversion algorithm is governed by simple decision rules (divide-and-conquer mechanism). Rule can be added or removed very easily.</p> <p>A rule will be fired if the input address satisfies the conditions of the rule (see Decision Rules for the Address Conversion Tool section).</p>
Fuzzy logic	Fuzzy logic is used for tokenizing the address. For details, please see Tokenization section.
Regular expression	Regular expression is used to identify keywords in tokenization process. All keywords that the tool recognizes are listed in annex.

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Decision Rules for the Address Conversion Tool

The tool uses a simple rule engine to convert addresses. The engine checks the rule 1-by-1 starting from rule 0. When a rule is fired, certain operations (merge, break, abbreviate, etc) will be performed. The address will then feed into the rule engine again until it can fit into the output dimension or maximum number of loop encountered.

The rules and their related operations are described below:

Rule	Firing Conditions	Outcome
Rule 0	If the address can fit into the output dimension.	The rule engine will terminate and the converted address is returned.
Rule 1	If the address is too large (the number of characters of the address is larger than the output).	Abbreviate the address. If the address is already abbreviated, it will raise a ConvertAddressException.
Rule 2	If the number of lines of the address is larger than the output (e.g. if the input contains 6 lines and the output is 5x60), and there exists 2 adjacent lines that can be merged.	Merge adjacent lines with the conditions that the resultant line will not longer than the output. When merge lines, a space is added in between.
Rule 3	If there exists a line longer than the output.	Move address components into next line until the current line is shorter than the output. When moving components into next line, a space is added in between.
Rule 4	If the address is not tokenized before.	Break the address into components (tokenize) and each component occupy 1 single line.

If none of the above rules fired, the rule engine will break the address into words and each word occupy 1 single line (similar to rule 4, but in word level instead of component level). If the rule engine still cannot fit the address into the output dimension, ConvertAddressException raise.

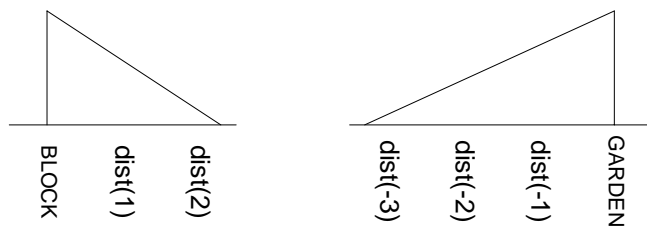
Tokenization

The tool tries to tokenize address into components such as flat, floor, building, street, etc. Some keywords are predefined into the tool. They are area names and district names (e.g. WAN CHAI) listed in ESD easy change of address, and some special keywords that can be commonly found (like FLOOR, FLAT, STREET, ROAD, etc).

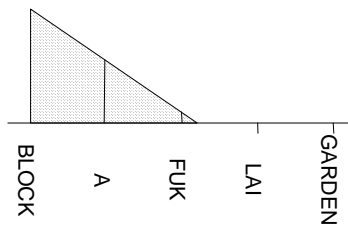
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For each keyword, a relationship equation is defined. The equation defines how a word is “related to” the keyword taking the distance between the word and the keyword as input. The basic idea of the relationship equation is derived from the principles of fuzzy logic. Tokenization is done by grouping “related” words together.

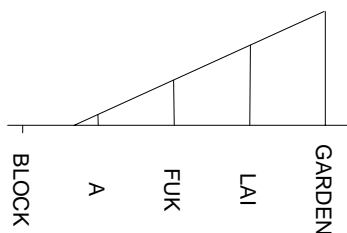
The following diagrams shows relationship equations for keywords BLOCK and GARDEN, where dist(1) means a word immediately after the keyword.



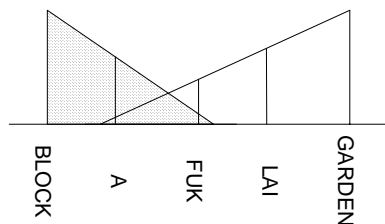
A line “BLOCK A FUK LAI GARDEN” run pass the relationship equation for BLOCK have the following result:



The same line run pass the relationship equation for GARDEN have the following result:



Combining the results from relationship equations for BLOCK and GARDEN having:



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In the above diagram, let's focus on the word "A". The result obtained from relationship equation for BLOCK (dotted area) is larger than that from relationship equation for GARDEN. As a result, the word "A" is considered "more related" to the keyword BLOCK. In the case of word "FUK", the result obtained from relationship equation for BLOCK (dotted area) is smaller than that from relationship equation for GARDEN. As a result, the word "FUK" is considered "more related" to the keyword GARDEN. Hence the line can be tokenized into components "BLOCK A" and "FUK LAI GARDEN".

The relationship equations are the key logic to tokenize address components. The relationship equations are still in tuning phase and increasing sampling data can increase the accuracy of the relationship equations.

Enquiry

For enquiry, please contact Interoperability Framework Co-ordination Group (IFCG) Standing Office of the Government of the Hong Kong Special Administrative Region (HKSARG) via email ifcg@ogcio.gov.hk.

Keywords used for tokenization into street components

The following keywords are hard-coded into the tool and are used in tokenization process. Every word in the address will test against the keyword list in order to determine which relationship equation to use. The keywords are case insensitive.

Keywords can be classified into following categories:

Category	Keywords
HK Region	(Single word region, e.g. KOWLOON, is not included) HONG KONG, H K, NEW TERRITORIES, N T 香港、九龍、新界
District / Sub-district	(Single word districts, e.g. CENTRAL, are not included) AP LEI CHAU, AU TAU, CASTLE PEAK BAY, CAUSEWAY BAY, CHA KWO LING, CHAI WAN, CHAU TAU, CHE KUNG TEMPLE, CHEK LAP KOK, CHEK MUN, CHEUNG CHAU, CHEUNG SHA, CHEUNG SHA WAN, CHI MA WAN, CHOI HUNG, CHU WONG LING, CHUEN LUNG, CHUNG HAU, CHUNG HOM KOK, CITY ONE, CLEAR WATER BAY, CROOKED ISLAND, DEEP WATER BAY, DIAMOND HILL, DISCOVERY BAY, FA PENG, FO TAN, FORTRESS HILL, FU TEI, FU YUNG SHAN, FUNG SHUE WO, GRASS ISLAND, GREEN ISLAND, HA LUNG CHUNG, HA TSUEN, HA WO CHE, HAM TIN, HANG HAU, HANG HAU, HAPPY VALLEY, HEI LING CHAU, HENG FA CHUEN, HENG ON, HO CHUNG, HO MAN TIN, HOK TSUI PENINSULA, HUNG HOM, HUNG MUI KUK, HUNG SHUI KIU, HUNG SHUI KIU, JARDINE'S LOOKOUT, JUNK BAY, KAM TIN, KAU LUNG HANG SHAN, KAU SAI CHAU, KAU TO SHAN, KENNEDY TOWN, KOWLOON BAY, KOWLOON CITY, KOWLOON TONG, KWAI CHUNG, KWAI FONG, KWAI HING, KWAN TEI, KWU TUNG, KWUN TONG, LAI CHI KOK, LAI KING, LAM TEI, LAM TIN, LAM TSUEN, LAMMA ISLAND, LANTAU ISLAND, LAU FAU SHAN, LAU SHUI HEUNG, LEI YUE MUN, LEUNG SHUEN WAN, LITTLE PALM BEACH, LO SHUE LING, LO WAI, LO WU, LOK FU, LOK MA CHAU, LONG PING, LUK KENG, LUNG KWU TAN, LUNG YEUK TAU, MA LIU SHUI, MA ON SHAN, MA TAU

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	WAI, MA TSO LUNG, MA WAN, MAI PO, MAN KAM TO, MANG KUNG UK, MEI FOO, MID-LEVEL, MIU TSAI, MIU TSAI TUN, MONG KOK, MOR LAW SHAN, MOUNT DAVIS, MUI WO, NAI WAI, NAM CHEONG, NAM CHUNG, SZE TEI SHAN, NAM WAI, NAM WAN, NGA KAU WAN, NGAU CHI WAN, NGAU TAM MEI, NGAU TAU KOK, NGONG PING, NORTH POINT, PAK KOK SHAN, PAK SHA WAN, PAK TAM CHUNG, PAK TIN, PAT HEUNG, PENG CHAU, PING CHAU, PING CHE, PING SHAN, PO LAM, PO TOI O, POK FU LAM, POR LO SHAN, PRINCE EDWARD, PUI O, QUARRY BAY, REPULSE BAY, SAI KUNG, SAI PIN WAI, SAI WAN, SAI WAN HO, SAI YING PUN, SAM DIP TAM, SAN HUI, SAN PO KONG, SAN SHEK WAN, SAN TIN, SAU MAU PING, SHA LO WAN, SHA TAU KOK, SHA TIN, SHA TIN WAI, SHAM SHUI PO, SHAM TSENG, SHAM WAT, SHAM WAT WAN, SHAP PAT HEUNG, SHAP SZE HEUNG, SHAU KEI WAN, SHEK KIP MEI, SHEK KONG, SHEK KWU CHAU, SHEK O, SHEK PIK, SHEK TONG TSUI, SHEK WU HUI, SHEUNG KO TAN, SHEUNG KWAI CHUNG, SHEUNG SHUI, SHEUNG SHUI HEUNG, SHEUNG SHUI WAI, SHEUNG WAN, SHUEN WAN, SHUEN WAN, SHUI HANG, SIN YAN TSENG, SIU HONG, SIU LAM, SIU LEK YUEN, SIU SAI WAN, SO KON PO, SO KWUN WAT, SOK KWU WAN, STONECUTTERS ISLAND, TA KU LING, TA KWU LING, TAI CHUNG HAU, TAI CHUNG KIU, TAI HANG, TAI KOK TSUI, TAI KOO, TAI KWAI WAN, TAI LAM, TAI LAM CHUNG, TAI MONG TSAI, TAI NGAU WU, TAI O, TAI PO, TAI PO KAU, TAI PO MARKET, TAI SHUI HANG, TAI SIU FAN, TAI TAM, TAI TONG, TAI TSOI YUEN KUI, TAI TUNG WO LIU, TAI WAI, TAI WO, TAI WO HAU, TAM MEI, THE PEAK, THE PEAK, TIM TIN TSAI, TIN LIU, TIN SHUI WAI, TING KAU, TING KOK, TIU KENG LENG, TO FUNG SHAN, TO KWA WAN, TONG FUK, TSEUNG KWAN O, TSIM SHA TSUI, TSING LUNG TAU, TSING YI, TSUEN WAN, TSUEN WAN WEST, TSZ WAN SHAN, TUEN MUN, TUNG CHUNG, TUNG WAN TAU, WAN CHAI, WANG CHAU, WANG LENG, WANG TAU HOM, WANG TOI SHAN, WANG TONG, WO HOP SHEK, WONG CHUK HANG, WONG TAI SIN, WU KAI SHA, WU KAU TANG, WU TIP SHAN, YAU KOM TAU, YAU MA TEI, YAU TONG, YAU YAT CHUEN, YING PUN, YUEN LONG, YUEN LONG KAU HUI, YUNG SHUE WAN
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	<p>九肚山、九龍坑山、九龍城、九龍塘、九龍灣、八鄉、十八鄉、十四鄉、又一村、三疊潭、下禾輦、上水、上水圍、上水鄉、上高灘、上葵涌、上環、土瓜灣、大小分、大水坑、大牛湖、大坑、大角咀、大洞禾寮、大埔、大埔尾、大埔滘、大埔墟、大埔頭、大涌口、大涌橋、大圍、大棠、大貴灣、大窩、大窩口、大網仔、大潭、大澳、大嶼山、大欖、大欖涌、小西灣、小棕林、小瀝源、小欖、山頂、川龍、中區、中環、元朗、元朗舊墟、天水圍、天后、太子、太古、太和、屯門、文錦渡、水坑、火炭、牙較灣、牛池灣、牛潭尾、牛頭角、仙人井、凹頭、北角、北角山、北區、北潭涌、半山、半山區、古洞、布袋澳、平洲、打鼓嶺、打鼓嶺、汀九、汀角、田寮、白田、白沙灣、石門、石崗、石湖墟、石硤尾、石塘咀、石鼓洲、石壁、石澳、磡石灣、兆康、吉澳、尖沙咀、米埔、老圍、老鼠嶺、西九龍、西貢、西區、西營盤、西邊圍、西灣、西灣河、何文田、佐敦、坑口、坑口、杏花邨、沙田、沙田圍、沙頭角、沙螺灣、秀茂坪、貝澳、赤柱、赤獵角、赤鱗角、車公廟、和合石、坪洲、坪輦、孟公屋、旺角、昂坪、昂船洲、東九龍、東涌、東區、東灣頭、林村、泥圍、油柑頭、油塘、油蔴地、芝麻灣、芙蓉山、花屏、虎地、金鐘、長沙、長沙灣、長洲、青山灣、青衣、青洲、南丫島、南昌、南涌、南區、南圍、南灣、屏山、恆安、洲頭、洪水橋、洪水橋、流水響、流浮山、炮台山、紅梅谷、紅磡、美孚、軍地、香港仔、朗屏、柴灣、泰亨、涌口、烏蛟騰、烏溪沙、粉嶺、索罟灣、荔枝角、荔景、茶果嶺、荃灣、荃灣西、馬料水、馬草壟、馬鞍山、馬頭圍、馬灣、堅尼地城、將軍澳、彩虹、掃桿埔、掃管笏、梅窩、淺水灣、清水灣、深井、深水灣、深水埗、深屈、深屈灣、第一城、春坎角、船灣、鹿頸、喜靈洲、愉景灣、渣甸山、菠蘿山、跑馬地、黃大仙、黃竹坑、塘福、塔門、奧運、廈村、慈雲山、新田、新蒲崗、新墟、楓樹窩、獅地山、落馬洲、葵芳、葵涌、葵興、道風山、滘西洲、筲箕灣、銅鑼灣、廟仔、廟仔墩、摩星嶺、摩囉山、樂富、潭尾、蝴蝶山、蝦龍涌、調景嶺、豬橫嶺、橫台山、橫洲、橫塘、橫頭磡、橫嶺、樹灣、機場、錦田、鴨脷洲、龍鼓灘、龍頭、龍躍頭、營盤、薄扶林、糧船灣、藍田、藍地、鯉魚門、羅湖、寶琳、蠔涌、鹹田、鶴咀半島、鹽田仔、灣仔、觀塘、鑽石山、鰂魚涌</p>
DD/Lot	<p>DD, SD, LOT, LOTS, CLL, IL, KIL, MWDD, section, sections, subsection, subsections</p> <p>約、地段、分段、餘段、小分段、丈量約份、測量約份</p>
Street	<p>Alley, avenue, AVE, boulevard, BLVD, bridge, circuit, close, corridor,</p>

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	crescent, CRES, drive, DR, embankment, highway, lane, interchange, parade, path, promenade, road, RD, row, street, ST, strand, tunnel, walk, "Queensway" 街、道、路、徑、里、坊、圍、巷、橋、段、幹線、走廊、交匯處
Street direction	North, n, East, e, South, s, West, w, Central, c 東、南、西、北、中
Building	Apartment, apartments, APT, APTS, arcade, ARC, bazaar, building, BLVD, BLDG, centre, center, CTR, city, chuen, complex, court, CRT, CT, cove, estate, EST, factory, FTY, garden, gardens, GDN, GDNS, height, heights, HT, HTS, hotel, house, houses, HSE, HSES, landmark, lau, lodge, mall, mansion, mansions, market, MKT, office, offices, park, place, plaza, quarter, quarters, QTR, QTRS, racecourse, race course, reclamation, rise, square, SQ, terrace, tower, towers, TWR, TWRS, tsuen, vill, villas, village, VLG, yuen 台、廈、臺、軒、樓、邨、苑、園、閣、居、村、埂、庭、峰、大廈、大樓、大學、中學、小學、宿舍、廣場、商場、中心、醫院、戲院、別墅、山莊、村屋、合署、酒店、馬場
Block	Block, blocks, BLK, BLKS, phase, PH, site, sites, stage, stages, suite, suites, tower, towers, TWR, TWRS 期、座
Floor	Floor, Floors, /F, /FL, Level, Levels 層、樓、字樓、閣樓
Room/Flat	Flat, flats, FLT, FLTS, room, rooms, RM, RMS, shop, shops, stall, stalls, suite, suites, unit, units 室、店、舖
PO Box	CPO Box, GPO Box, Post Office Box, P O Box, C P O Box, G P O Box, C Post Office Box, G Post Office Box 信箱、郵箱、中央郵箱、郵局郵箱
Special location	Bay, Beach, Praya, Wan 灣、海旁
Special range	NO, NOS, - 及、至
Special group	地下、地庫、車位、街坊福利會、第 XX 號、XX 號、第 XX 區、XX 區

Special conditions in tokenizing address

Situation	Outcome
Keyword “TOWER” or “TWR”	The word “TOWER” can sometimes be part of building name (e.g. WEST GATE TOWER) or be part of block name (e.g. TOWER 1, THE GATEWAY). As a result, the relationship equation for “TOWER” is similar to combining the relationship equations of building and block.
Keyword “HOUSE” or “HSE”	The word “HOUSE” can sometimes be used as “HOUSE NO. 17 GREENFIELD VILLA” or “KING'S HOUSE”. If the word “HOUSE” appears as the first word of an address line, the tool will treat it as case “HOUSE NO”, otherwise, the tool will treat as case “KING’S HOUSE”.
If 2 successive keywords for building found (e.g. “FORTUNE FACTORY BUILDING”, where FACTORY and BUILDING are building keywords)	The first building keyword (e.g. FACTORY in the example) will be ignored. As a result, the tool will treat it as 1 single building and group “FORTUNE FACTORY BUILDING” together.
If a building keyword immediately followed by street keyword (e.g. “FA YUEN ST”, where YUEN is a building keyword and ST is a street keyword)	The building keyword (e.g. YUEN in the example) will be ignored. As a result, the tool will treat it as a street and group “FA YUEN ST” together.
If a street keyword immediately followed by building keyword (e.g. “PO ON ROAD COMPLEX”, where ROAD is a street keyword and COMPLEX is a building keyword)	The street keyword (e.g. ROAD in the example) will be ignored. As a result, the tool will treat it as a building and group “PO ON ROAD COMPLEX” together.

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Situation	Outcome
If a location keyword immediately followed by building keyword or street keyword (e.g. “ABERDEEN PRAYA ROAD”, where PRAYA is a location keyword and ROAD is a street keyword)	The location keyword (e.g. PRAYA in the example) will be ignored. As a result, the tool will group “ABERDEEN PRAYA ROAD” together.
Keywords for Chinese special range token (e.g. “及” and “至”)	If the word before belongs to a keyword listed in Annex A (e.g. “103 室至 105 室”, where “室” belongs to room/flat keyword), the tool will tokenize it into 3 components (i.e. “103 室”, “至” and “105 室”).
If a block keyword (apply to Chinese characters only) immediately followed by building keyword (e.g. “第三期商場”, where 期 is a Chinese block keyword and 商場 is a Chinese building keyword)	The block keyword (e.g. 期 in the example) will be ignored. As a result, the tool will group “第三期商場” together.

Known limitation for the Address Conversion Tool

Situation	Outcome
For the case when 2 building keywords found in the same address line (e.g. “WALDORF GARDEN SHOPPING ARCADE”, where GARDEN and ARCADE are building keywords).	The tool will break into 2 tokens “WALDORF GARDEN” and “SHOPPING ARCADE” instead of grouping them together.
For the case when a street keyword followed by a word then followed by a building keyword (e.g. “WING HANG RD IND BLDG”, where RD is a street keyword and BLDG is a building keyword).	The tool will break into 2 tokens “WING HANG RD” and “IND BLDG” instead of grouping them together.
The tool break address “EAST COMMERCIAL BLOCK SOUTH HORIZONS” into “EAST COMMERCIAL” and “BLOCK SOUTH HORIZONS”.	It is an exceptional case. The tool can only handle addresses like “BLOCK B XXX GARDEN”. Another exception is: “FRONT BLOCK 200 ABERDEEN MAIN ROAD”, the tool will break into “FRONT”, “BLOCK 200” and “ABERDEEN MAIN ROAD”.

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¹ <http://www.xml.gov.hk>

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