

ORACLE CORPORATION
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS —(Continued)
May 31, 2019

The following table summarizes stock option activity, including SOs and PSOs, and includes awards granted pursuant to the 2000 Plan and stock plans assumed from our acquisitions for our last three fiscal years ended May 31, 2019 :

(in millions, except exercise price)	Options Outstanding	
	Shares Under Stock Option	Weighted-Average Exercise Price
Balance, May 31, 2016	375	\$ 29.66
Granted (1)	18	\$ 40.90
Assumed	2	\$ 13.06
Exercised	(77)	\$ 26.65
Canceled	(6)	\$ 36.28
Balance, May 31, 2017	312	\$ 29.02
Granted (2)	77	\$ 50.95
Exercised	(78)	\$ 28.78
Canceled	(7)	\$ 45.70
Balance, May 31, 2018	304	\$ 36.11
Granted	7	\$ 43.47
Exercised	(72)	\$ 28.32
Canceled	(17)	\$ 49.28
Balance, May 31, 2019	222	\$ 37.78

(1) 6.75 million SOs were granted in total during fiscal 2017 to our Chief Executive Officers and Chief Technology Officer and have contractual lives of five years versus the ten-year contractual lives for most of the other SOs granted.

(2) Awards granted in fiscal 2018 included 66.5 million PSOs granted in total to our Chief Executive Officers, Chief Technology Officer, and former President, Product Development, the contractual terms of which are described in greater detail above.

Stock options outstanding that have vested and that are expected to vest as of May 31, 2019 were as follows:

	Outstanding Stock Options (in millions)	Weighted-Average Exercise Price	Weighted-Average Remaining Contract Term (in years)	Aggregate Intrinsic Value (1) (in millions)
Vested	146	\$ 32.13	3.32	\$ 2,698
Expected to vest (2)	42	\$ 46.95	6.47	181
Total	188	\$ 35.45	4.02	\$ 2,879

(1) The aggregate intrinsic value was calculated based on the gross difference between our closing stock price on the last trading day of fiscal 2019 of \$50.60 and the exercise prices for all "in-the-money" options outstanding, excluding tax effects.

(2) The unrecognized compensation expense calculated under the fair value method for shares expected to vest (unvested shares net of expected forfeitures) as of May 31, 2019 was approximately \$254 million and is expected to be recognized over a weighted-average period of 2.74 years. Approximately 34 million shares outstanding as of May 31, 2019 were not expected to vest.

Stock-Based Compensation Expense and Valuations of Stock Awards

We estimated the fair values of our restricted stock-based awards that are solely subject to service-based vesting requirements based upon their market values as of the grant dates, discounted for the present values of expected dividends.

The fair values of our PSUs were also measured based upon their market values as of their respective grant dates, discounted for the present values of expected dividends. The vesting conditions and related terms of our PSUs were communicated to each participating employee as of their respective grant dates and included attainment metrics that were defined, fixed and based upon consistent U.S. GAAP metrics or internal metrics that are defined, fixed and consistently determined, and that require the employee to render service. Therefore, these awards met the performance-based award classification criteria as defined within ASC 718.

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We estimated the fair values of our stock options that were solely subject to service-based vesting requirements using the Black-Scholes-Merton option-pricing model, which was developed for use in estimating the fair values of stock options. Option valuation models, including the Black-Scholes-Merton option-pricing model, require the input of assumptions, including stock price volatility. Changes in the input assumptions can affect the fair value estimates and ultimately how much we recognize as stock-based compensation expense. The fair values of our stock options were estimated at the grant dates or at the acquisition dates for options assumed in a business combination. The weighted-average input assumptions used and resulting fair values of our service-based stock options were as follows for fiscal 2019, 2018 and 2017:

	Year Ended May 31,		
	2019	2018	2017
Expected life (in years)	4.6	4.7	4.8
Risk-free interest rate	2.7%	2.0%	1.0%
Volatility	24%	22%	23%
Dividend yield	1.7%	1.5%	1.5%
Weighted-average fair value per share	\$ 10.77	\$ 9.34	\$ 8.18

The expected life input is based on historical exercise patterns and post-vesting termination behavior, the risk-free interest rate input is based on U.S. Treasury instruments, the annualized dividend yield input is based on the per share dividend declared by the Board, and the volatility input is calculated based on the implied volatility of our publicly traded options.

We estimated the fair values of the PSOs granted during fiscal 2018 at approximately \$10 per share using a Monte Carlo simulation approach as of the grant date with the following assumptions: risk-free interest rate of 2.14%, expected term of seven years, expected volatility of 22.44% and dividend yield of 1.49%.

Stock-based compensation expense is included in the following operating expense line items in our consolidated statements of operations:

(in millions)	Year Ended May 31,		
	2019	2018	2017
Cloud services and license support	\$ 99	\$ 82	\$ 54
Hardware	10	10	11
Services	49	52	44
Sales and marketing	360	361	306
Research and development	963	921	770
General and administrative	172	180	130
Acquisition related and other	—	1	35
Total stock-based compensation	1,653	1,607	1,350
Estimated income tax benefit included in provision for income taxes	(358)	(451)	(423)
Total stock-based compensation, net of estimated income tax benefit	\$ 1,295	\$ 1,156	\$ 927

Tax Benefits from Exercises of Stock Options and Vesting of Restricted Stock-Based Awards

Total cash received as a result of option exercises was approximately \$2.0 billion, \$2.3 billion and \$2.1 billion for fiscal 2019, 2018 and 2017, respectively. The total aggregate intrinsic value of restricted stock-based awards that vested and were issued and stock options that were exercised was \$3.1 billion, \$3.0 billion and \$2.0 billion for fiscal 2019, 2018 and 2017, respectively. In connection with the vesting and issuance of restricted stock-based awards and stock options that were exercised, the tax benefits realized by us were \$692 million, \$860 million and \$614 million for fiscal 2019, 2018 and 2017, respectively.